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ABSTRACT

This practicum report describes a program designed to increase elementary teachers' comfort and skill in the use of computer related technology for the purpose of establishing effective integration of instructional technology. Other stated ancillary goals included improved instructional effectiveness in the classroom through the development of an alternative mode of computer applications, and an increase of interactive rather than passive modes of instruction. Implementation processes comprised strategic, long range planning, and comprehensive training and staff development. Six formal workshops were then offered to teachers to provide theoretical information on the integration of computers and computer technology in the classroom as well as information on practical applications. An additional three workshops were devoted to practice, simulation, and application of newly acquired concepts and skills. Formative and summative evaluations of the training component accompanied the design and presentation. Pre- and post-implementation data as collected from teacher questionnaires and direct observation were analyzed. Results revealed: (1) increased involvement in integrating computer assisted instruction into the classroom; (2) an increase in student exposure to CAI experiences; (3) a decrease in teacher technophobia; and (4) increased effective utilization of computers by training participants. It is recommended that training sessions continue to be offered, using available on-site software. Appendices contain the questionnaire, planning guidelines, action plans, evaluation forms, and the technology leader's training manual. (31 references) (Author/DB)

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Improving Elementary Teachers' Comfort and Skill with Instructional Technology through School-Based Training

by

Elizabeth C. Brennan

Cluster 38

A Practicum I Report presented to the Ed.D. Program in Child and Youth Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

NOVA UNIVERSITY

1991

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Aug. 22, 1991
Date of Final Approval

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ABSTRACT

Improving Elementary Teachers' Comfort And Skill With Instructional Technology Through School-Based Training. Brennan, Elizabeth C., 1991: Practicum I Report, Nova University, Ed.D. Program in Child and Youth Studies. Descriptors: Instructional Technology/Computer-based Learning/Computer Applications/Integrating Technology/ Computer Configurations/Educational Implementations of Technology/Technophobia/Staff Development/Inservice Training

This practicum aimed to increase elementary teachers' comfort and skill in the use of computer related technology for the purpose of establishing effective integration of instructional technology. Other ancillary goals included potentially improved instructional effectiveness through the development of an alternative mode of computer applications and an increase of interactive rather than passive modes of instruction.

Processes of effective strategic, long-range planning and comprehensive training and staff development comprised the twelve-week implementation phase. Designed to allow for site-based management and shared decision-making in the process of determining computer applications, the instructional staff formulated goals, objectives, and action plans for the integration of computer-based learning experiences. Six formal workshops were presented to teachers for the purpose of providing both theoretical information and practical applications, followed by three sessions devoted to practice, simulation, and application of newly acquired concepts and skills. Formative and summative evaluations of the training component accompanied the design and presentation based on needs of the constituents. Pre and post-implementation data as collected from teacher-completed questionnaires and direct observation were analyzed and degrees of change as per project objectives calculated accordingly.

Outcomes of this practicum were quite favorable. Improvement in teachers' ability to effectively apply computer-based learning experiences was noted as a result of provision for training needs and requirements. Positive outcomes included heightened integration of instructional technology, increased involvement and use of computer applications, and improved affective response to the use of computer related technology as an instructional tool.

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CHAPTER I

INTRODUCTION

Description of Community

The purpose of this practicum was to develop improved use of instructional technology and computer-based learning experiences for elementary grade students in an independent suburban school. Housed on the main campus of a private university, the laboratory school encompasses all grades from Early Childhood through Grade 12. Supported by an average tuition of approximately $5,000, the school offers a rigorous academic curriculum designed to meet the individual instructional needs of average, above average, and gifted students. The socio-economic disposition of the school is proscribed somewhat by the tuition rate, and the parent profile is best described as a group of well-educated professionals, as a significant number of parents are recognized as leading physicians, attorneys, or businessmen.

Additionally, the faculty and staff of the school and of the University are represented in the parent constituency.

School publications purport the significance of an independent school education as effective in delivering appropriate and meaningful educational opportunities geared toward personal instructional needs as opposed to a standard curriculum presented to large groups and bound by public district procedure. Thus, the school is placed in a type of client relationship whereby the parents as consumers are desirous of high standards of educational excellence, quality control and academic accountability. Committed by philosophical intent and mission statement to an individualized instructional program that is facilitated through implementation of computer-based learning experiences, the school provides a total of 48 microcomputers for student use. A combination of configurations or designs for housing the hardware includes a 28 station central lab facility hosting a networked integrated learning system software curriculum, individual classroom computers, and several grade level computer clusters of two or three work stations each with provision for a wide array of stand alone software programs for all curricula.

The school is comprised of two divisional designations; the Lower School, grades Early Childhood Four (pre-kindergarten, age four) through Grade Five, and the Upper School, grades Six through Twelve. Total school enrollment approximates 1,100 students; 546 students are registered in the Lower Division. The facility is administered by a Headmaster and divisional Directors under the jurisdiction of the School Center Dean, University President, and Board of Trustees. Utilizing a team teaching approach in a semi-open physical environment, the Lower School programs provide instruction in homogeneous groups based on ability and learning style for reading and for mathematics, while all other instruction is offered in heterogeneous groups.

Writer's Work Setting and Role

The Lower School consists of 47 faculty and staff under the direction and supervision of the writer as building administrator.

Grade level teaching teams are comprised of four teachers and one or two full-time teacher aides. All are

cooperatively and collaboratively responsible for the 75 to 88 students in that grade level. The pupil/teacher ratio is generally 22:1 for instructional purposes and scheduling, and the utilization of paraprofessionals, student teacher interns, and parent volunteers allows for greater flexibility and application of small group instructional design.

Individual needs of the students are addressed through a regrouping process whereby students are placed in small instructional groups based upon ability, learning style and skill level. Approximately 22 students are assigned to one of the teaching team members for reading, and another via the same process for mathematics. In contrast, four heterogeneous groupings are created for instruction in other curricula. For the students, this process results in membership of three distinct groups, often comprised of different peers each time; one for instruction in reading and language arts, another for mathematics, and a third for other core subjects. Teachers specialize in the areas of science, social studies, writing skills, and enrichment. Each provides instruction in a departmentalized fashion to all of the students in a grade via the heterogeneously grouped format, therefore teaching every student in at least one

academic subject.

Teaching teams in the Lower School are led by a Team Coordinator responsible for supervising all grade level programs and activities. As a group, the Team Coordinators interact regularly with the Director, assuming delegated administrative roles. Considered a well credentialed faculty by the institution's accrediting bodies, a review of personnel files indicates all members hold valid certification in field and 30 of the faculty have earned Master's Degrees in Education.

The writer assumes all duties and responsibilities associated with elementary school administration. Assisted by an Academic Coordinator, responsibilities of the Director include, but are not limited to, the supervision and and coordination of divisional instructional programs, academic affairs, physical plant, and personnel. Additional duties involve the development and management of curricula, budget, staff, and daily school operations. The writer also serves as liaison between the official parent organization and on general governing school councils or advisory boards.

Regular and frequent grade level, departmental, and Team Coordinator meetings as scheduled by the writer maintain open lines of communication with the faculty and

facilitate interactions between faculty and administration. Utilizing the Team Coordinators in an administrative role, the writer delegates certain responsibilities and/or decision making to faculty and staff in a school-based management format while retaining overall degrees of authority to supervise, approve or disapprove, recommend, and provide leadership in all respects.

CHAPTER II

STUDY OF THE PROBLEM

Problem Description

Concurrent with the mission statement of the University, the philosophy of the school purports a rigorous academic program that is facilitated through implementation of educational technology, specifically computer-based learning experiences. The utilization of a central lab design whereby classes of 20 or more elementary students are scheduled once or twice weekly failed to provide extensions of the classroom instructional processes. This process also failed to facilitate customized instructional experiences at the computer as recommended or prescribed by the classroom teacher. Instead, students generally seemed to proceed arbitrarily through the software curricula as determined by examination of extant practices and procedures of computer applications in this style.

Thus, students were working on particular skills in the classroom and presented with others while engaged in computer-based learning activities, resulting in a diverse or disjointed exposure to a foray of instructional demands. Briefly stated then, the problem was: An analysis of computer applications and implementations indicated that elementary school teachers were not generally comfortable or skilled in the use of instructional technology and were therefore unable to exploit its potential for enriching learning experiences.

Many of the teachers showed little interest in assuming an active role in the use of instructional technology, others were demonstratively resistant to its use, and some positively accepted the concept, but felt ill-equipped or lacked training for effective integration. An effective application of computer related technology had to be developed whereby teachers effectively integrated instructional technology, specifically computer-based activities into daily classroom learning experiences.

Problem Documentation

The problem of inadequate and ineffective use and integration of computer-based instruction was documented by direct observation of the computer lab instructional delivery procedures, and an interview with the school computer specialist. A review of yearly teacher performance evaluations via personnel records indicated teachers' lack of skill or comfort in the use of instructional technology. Additionally, teachers completed questionnaires addressing the efficacy of the current approach toward utilization of computers for instructional purposes (see Appendix A).

A systematic observation conducted by the writer of the central computer lab program during a typical weekly schedule indicated that the current scheduling format allowed for only two 30 minute computer-based learning activity periods per student per week. This was provided in a format whereby the entire class left the regular classroom to go to the lab, attended by a teacher aide or parent volunteer while the teacher was provided with a break or instructional planning period. Teachers were therefore unaware of the types of learning experiences provided to the students and were unable to monitor progress since

utilization of computers in this sense, as a separate entity or addition to the classroom curriculum, required little or no interaction between teacher/student or teacher/technology. Once placed in the continuous program of the integrated learning system software curriculum that is comprised of approximately 1800 developmentally sequential lessons in reading, mathematics and language arts, students proceeded from one lesson to the next within that scope and sequence regardless of the classroom curriculum, thus, experiencing lessons with no correlation to classroom instruction.

An interview held with the writer and the computer lab attendant further documented the nature of the problem. It revealed that during a typical weekly schedule that provided two 30 minute sessions at the computer for each student of 27 instructional classes or groups, only eight of the 27 teachers provided direct input, prescription, or suggestion as to the nature of provision for computer-based activities as related to classroom learning experiences. The eight teachers involved in suggesting specific learning experiences did so voluntarily, and generally recommended lessons or topics based on remedial needs. The lab attendant further stated that even when questioned directly, teachers gave only general curricular areas or topics applicable to the entire group as opposed to

precise learning objectives as delivered to small groups of students or individual learners. The lab attendant also noted that further attempts and efforts to acquire specific information were not well-received by the faculty in general and that the most useful data was collected by asking the students in light of this discomfort.

The writer's review of yearly school-based teacher performance evaluations indicated that of the 23 returning teachers, six self-evaluated personal effectiveness with respect to general utilization of computers as only "Satisfactory" and seven self-rated as "Needs Improvement" from among indicators that ranged through "Outstanding, Above Average, Satisfactory, Needs Improvement, and Unacceptable". This suggests that only ten of the returning instructional staff perceive their personal effectiveness relative to computer applications to be within positive ranges or indicative of an instructional strength versus an instructional weakness. Among the behavioral aspects addressed were such elements as degree of integration within the total curriculum, selection of activities based on individual needs, amount of active involvement or communication with the lab attendant, as well as ability to manipulate available hardware and knowledge of operational procedures relative to both hardware and software.

Table 1 provides a descriptive representation of the teachers' self-report with respect to the total number of teachers responding to each behavior and to what degree.

Table 1

Teachers' Response to Personal Effectiveness

Behavior	Degree of Effectiveness					Percent Positive
	O	AA	S	NI	U	
Integration	1	5	8	5	4	26
Prescription	Ø	3	8	9	3	13
Communication	4	3	12	2	2	3Ø
Knowledge of Hardware	3	5	1Ø	4	1	35
Operational Procedures	2	2	5	11	3	17
Overall Effectiveness	2	8	6	7	Ø	43

n = 23 X = 27

Teacher completed questionnaires were designed and administered by the writer and data compiled to specify and document the extant problem (see Appendix A). During a typical week of instruction in reading and mathematics, teachers integrated computer-based learning experiences as related to classroom curricula and for the purpose of extending classroom instruction on an average of one of the possible ten periods of instruction. The mean rate of response with regard to levels of confidence or familiarity with available software was "somewhat insecure, requiring assistance", while that for operational procedures was "Unsure or unfamiliar; unable independently". With respect to attitude toward computer applications, only 13 of the 27 teachers indicated positive response toward computer integration, acceptance of computers, or the role of computers in educational contexts.

Causative Analysis

Several causes for the stated problem contributed to stationary or declining effectiveness of application or integration of instructional technology. The school had

not articulated a long-range planning process for the integration of instructional technology, nor solicited active involvement of classroom teachers by establishing a consensus for change at the instructional level. Rather, some decisions regarding applications of instructional technology were made by upper-level administration and mandated to classroom teachers thereafter. As a result, the teachers were reluctant to implement any type of innovation when not included in the decision-making process that directly impacts the classroom instructional exchange.

Additionally, the classroom teachers had not been provided with the necessary inservice training and staff development to promote and continue active implementation leading toward effective integration of computer-based instructional events. Without the necessary prerequisites for effective utilization of technology, teachers were ill-equipped to use such devices as instructional tools. Furthermore, inservice training offered through the local public sector schools dealt primarily with functional literacy or specific software options as opposed to methodologies for use in the elementary classroom.

Another contributing factor appeared to be that classroom teachers failed to recognize the capabilities of computer technology as a tool for instructional

effectiveness and maintained a mindset toward traditional instructional formats. Although some regarded the computer as an effective supplement for drill and practice, few considered it as able to develop new skills. The teachers were inclined to regard themselves as the dispensers of knowledge, upon whom students were dependent for learning. This factor was apparent despite reform efforts within the school to promote the teacher as a manager or facilitator instead of giver of information.

Finally, the classroom teachers were unfamiliar with or unaware of the scope and sequence of available local software at respective grade levels. Catalogs of individual software programs existed, yet teachers had more frequently been dependent upon the expertise of the school computer specialist for selection of computer-based learning experiences. Also, there was limited time during the school day when teachers could preview courseware, a lengthy process in and of itself.

Relationship of the Problem to the Literature

A review of literature provides correlation evidence as to the nature of the stated problem as Kulik (1984), Mys and Petrie (1988), Pogrow (1986), Scott and Barber (1988) and Whitaker, Schwartz, and Vockell (1989) suggest various obstacles to the acceptance and use of computer-based instructional events. Even the specialists in the field of computer education note difficulties with integration of instructional technology citing that some feel specifically the process of reading to to be incompatible with computer related technology and that this belief has contributed to difficulties in the acceptance of computers (Whitaker et al., 1989). Additionally, teaching machines as introduced to improve instructional effectiveness several decades ago failed to meet these expectations and as a result, many teachers are reluctant to apply computers in the classroom. Another obstructing force is teachers' failure to appreciate the potential capabilities of instructional technology as an empowering force. Finally, lack of training for education majors at the college or university level prohibits new teachers from taking a proactive leadership role regarding

the use of computers or acquiring the knowledge necessary to use the technology in the schools. These findings clearly associate with teachers' lack of comfort or skill in the use of instructional technology and certainly contribute to an inability to exploit its potential.

In a study of elementary school students' attitude toward typical computer applications comprised of computer assisted instruction, games, functional literacy, and a brief exposure to programming and word processing, Pulos and Fisher (1986) state that the students thought the computer lab was a waste of time because it did not have a direct positive effect upon classwork or school assignments. The results of this study indicated that a majority of the students felt the computer work was too easy, and some indicated a desire for more meaningful, relevant work as opposed to games or literacy procedures. Additionally, some students stated disappointment with respect to learning how to use the computer, but never having the chance to do so on a limited weekly exposure or contact. Thus, perhaps the schools should attempt to alter the nature of the central lab style of computer usage, and consider a means by which technology can provide appropriate learning experiences for students.

Other authors discuss the need for intentional and specific consideration of those elements of teaching that can best be performed by computer related technology to assist teachers in the process of adapting instruction to individual needs. Beginning with areas of instruction that are typically difficult to deliver or troublesome through conventional teaching methods, teachers can recognize positive effects of the use of technology. According to Bright (1987), and Galloway (1990), instructional events via the computer can be incorporated within the regular classroom teaching-learning process, but only with a systematic, purposeful planning effort. This should be accompanied by a restructuring of the curriculum coupled with funding, administrative support and schoolwide commitment to expansion and use of technology. In contrast, according to Pogrow (1990), believing that software itself can be instructional in nature and therefore produce significant amount of achievement via conventional computer applications is not a well-founded theory. This study suggests the notion that central to lack of academic achievement for some students is an inability to successfully initiate and regulate thinking strategies especially those processes required for the acquisition of information from

representational symbols commonly associated with laboratory type repetitive drill and practice software. It was also noted that a literal use of software is not likely to result in learning improvement without adequate direct instructional methodologies applied in the classroom, effectively by the teacher.

Goodson (1986) and Scott and Barber (1988) discuss difficulties in achieving effective instructional improvement through computer usage in cases where neither the school personnel nor the students were adequately prepared to assimilate advancing technology into the daily curriculum. The investigation showed that elementary schools involved in the study had an average of 25-35 computers that were typically housed in a central lab facility or dispersed, one or two per classroom. The report noted that on a general basis students received an average of approximately 30 minutes of computer instruction per week and that other personnel including media specialists, teacher aides, and computer specialists were frequently responsible for providing, selecting, and/or monitoring computer-based learning experiences. Among the questionable aspects was the design of distribution modes, but more specifically, the effectiveness of only 30 minutes of exposure to the

computer-based activities. Implicit in this report is the degree to which classroom teachers are actively involved in management of instructional technology if the students are under the direction of extraneous personnel.

Focusing upon the importance of the teacher in the process of integration, Hoot and Kimler (1987, p.3), state that the role of the teacher is considered to be the most crucial determining factor relative to the effectiveness of computer applications, and implementations based upon teachers' lack of understanding of "both the power and limitations of software programs" contribute to lack of success. Endeavors geared toward the use of instructional technology should be founded upon teachers' acceptance and well-developed background in both the use and process of using computers for teaching and learning.

Vockell (1986) discusses ambivalence and misinterpretation of research findings which address effectiveness of computer-based instruction. This report focused upon the theoretical framework within which the applications are utilized, and states that instruction will be more likely to prove ineffective when applied in a haphazard or pedagogically unethical style. Thus, without comprehensive and systematic planning prior to implementation, the use of computers for instructional

purposes will be no better than a poorly designed and delivered lesson.

According to Jolicoer and Berger (1988), Pulos and Fisher (1986), and Whitaker et al. (1989), problems with instructional effectiveness are also attributable to unsubstantiated, ineffective, and in some cases pedagogically unsound software products utilized in the teaching- learning process. It was found that teachers' disappointment with inappropriate and inaccurate courseware is associated with reluctance to further employ different programs at another time. Frequent failures of software to deliver what it claimed to caused teachers to decrease, discontinue or reject computer-based learning activities within the classroom or as potential extensions of curricula developed in more traditional frameworks.

Goodson (1986), and Jolicoer and Berger (1988) discuss causal factors associated with difficulties resultant from poor long-range strategic planning with respect to implementation of computers with inadequate consideration and identification of the role to be played by technology in the schools. According to Goodson (1986), Kulik (1984), and Scott and Barber (1988), personnel must receive significant training about how to effectively and efficiently integrate computers as a part

of the instructional process. Less than ten hours of specific versus generic applications will not contribute to program effectiveness or successful implementation, and can be considered a contributing cause of ineffective applications. Additionally, Pogrow (1986, p.20) states that mandated use of programs or change will rarely leave a lasting impact and believes that "computers don't make changes - people do". Thus, failure to actively include the participating faculty in the planning and decision making process with respect to the newness of computer related technology will result in a less effective implementation. This report further states that the selection and application of computer use by individuals indirectly involved in the instructional process may not be effective. When decisions are made by upper-level administrators, selections may not be based upon identification of needs, or linked directly to increased learning outcomes, or be capable of producing improved learning when compared to conventional teaching.

According to Barba (1990), Dubois and Schubert (1986), and Pogrow (1990), a variety of problems including inappropriate use, inequitable access, or lack of use of available computer related technology can be documented in both central lab and classroom distribution configurations

causing the effectiveness of the implementation to be less than satisfactory. This implies the need for investigation of alternative distributions or modes of locating computers for the most effective outcome.

Perelman (1990) discusses two causal elements relative to the lack of success with typical computer applications in the schools. In this study it was noted that a majority of classroom teachers had shown no interest in expanding computer-based instruction because there was no reward system, provision for incentive, or return to the teacher for the effort. Furthermore, additions and enhancements to the existing technology have simply resulted in more of the same, rather than innovative utilization of computers in the schools.

Among the topical areas investigated in the literature review were studies concerned with effects of computer integration within learning situations ranging from primary through college level students. It was noted that problems were evidenced with use from at-risk students through gifted learners, and with applications in reading as well as mathematics. Modes of distribution which included central lab and classroom placement were discussed in various studies indicating both positive as well as negative outcomes.

CHAPTER III

ANTICIPATED OUTCOMES AND EVALUATION INSTRUMENTS

Goals and Expectations

Projected outcomes of this practicum involved the development of an alternative mode of computer configuration for the purpose of establishing effective integration of instructional technology while improving elementary teachers' comfort and skill in the use of computer related technology for instructional purposes. The goal of this project as initiated by the writer was to improve instructional effectiveness through an appropriate and meaningful application of computer-based learning experiences. Outcomes expected computer usage comprised of interactive rather than passive modes of instruction and increased teacher involvement. Additionally, increased teacher comfort and skill in the process of integrating computers within the teaching-learning experience was anticipated.

Behavioral Objectives

Specific objectives and outcomes of the project were designed to assess change as a result of implementation and were drawn from hard data evidence as to the nature and existence of the problem. After a three month implementation period, the following objectives were projected for this practicum to be considered successful:

1. Elementary students will be provided with computer-based learning experiences at least four times weekly as an extension of and integrated within reading and mathematics instruction as determined by a post-implementation systematic observation conducted by the writer.
2. During a typical weekly computer schedule, all 27 elementary school teachers will provide direct input, prescription, or suggestion as to provision for computer-based learning experiences for their respective reading and mathematics classes as determined by a

post-implementation interview between the writer and the computer lab attendant with a minimal increase of 19 additional teacher response and active involvement.

3. At least 20 of the 27 elementary teachers will self-evaluate personal effectiveness with respect to utilization of computers as at least "Above Average" from among indicators on a school-based teacher performance evaluation with a minimal global improvement of 30 percent positive response and a minimal individual improvement of 25 percent positive response in all 13 cases of prior negative evaluation.
4. All of the 27 elementary teachers will indicate positive attitudes toward computer applications as measured by the administration of a post-implementation questionnaire (see Appendix A) designed by the writer with an increase of at least 14 improved attitudinal responses.

Measurement of Objectives

Projected outcomes were determined through an analysis and interpretation of results acquired by means of pre and post-implementation comparison of several indicating tools. Degrees of improved change were calculated accordingly.

A systematic observation of the daily computer program indicated the number of times weekly that students received computer-based learning experiences as well as the number of times that activities correlate to classroom instruction. Frequencies were tallied on a daily basis during a typical weekly schedule by category as "Correlated" or "Not Correlated" directly as an extension of classroom instruction and curricula. Direct in nature, this method was an accurate and efficient manner by which to assess the concrete factors of "how often" and "what type of" applications existed. It further allowed for easy comparison and interpretation in a pre and post test mode. Although somewhat cumbersome because of the necessity to frequent the lab every 30 minutes daily for one week, this method was selected as optimal for accuracy through first-hand experience.

Additionally, a post-implementation interview with the computer lab attendant was conducted to determine the number of teachers involved in active prescription and direct input for computer-based experiences. Based upon both verbal and written communication between the lab attendant and the teachers, as well as actual teacher manipulation and use of the management system that accompanies the software program, the lab attendant was able to note the number of teachers "Participating" and "Not Participating" by subject, either reading or mathematics, and how often on a weekly basis. This approach allowed for response that was clear and specific and allowed for comparisons between grade levels (teaching teams as an entity) as well as individual assessments. The presence of the lab attendant on a daily basis provided a consistent record and accurate determination through direct observation. Utilizing written programming requests and anecdotal record of conversations with the teaching staff, the lab attendant was efficiently able to collect data that was easily compared according to all constructs during regular class time with minimal effort that required about ten minutes daily.

A school-based teacher performance evaluation addressed personal effectiveness with respect to

utilization of computers. Teachers regularly self-evaluated a variety of instructional behaviors, including an indicator designed to assess degrees to which the faculty utilized computer-based learning experiences and for what purpose. Ratings on the written scale included "Outstanding, Above Average, Satisfactory, Needs Improvement, and Unacceptable". Several purposeful applications were suggested including use for reinforcement, remediation, introduction, or development and an area for open-ended comment or statement of explanation was provided. This instrument was most effective for determining global levels of functioning and in designing effective treatment based on the needs of the participants. The five scale response format allowed for efficient computation of changes in affect, while the open-ended comment portion provided specificity and explanation relative to areas of weakness. When analyzed by pattern, the self-evaluation facilitated the planning of inservice content. Considering the self-report style of this instrument, anonymity was suggested as an effort to acquire responses indicative of each teacher's true feelings both prior to and following implementation. The concise nature of the instrument required approximately five minutes per individual for administration and

completion, and as part of regular faculty responsibility did not require additional work as prompted by this project.

A written questionnaire designed by the writer sought to identify specific and detailed information about several facets of computer applications (see Appendix A). The primary intent of the instrument was to determine the extent to which computer-based learning experiences were integrated within the curriculum to augment direct instruction. Open-ended in style, the ten questions elicited the number of times per typical week teachers personally prescribed computer-based activities in reading and mathematics, allowed the computer specialist to do so, and how often teachers consulted available software curriculum manuals for implementation purposes. The instrument further assessed through a rating scale of one through five, the teachers' familiarity with specific lessons, scope and sequence, and operational procedures of the software management system. A rating of "One" corresponded to high degrees of confidence and independent competence, while a score of "Five" designated a self-report of insecurity, unfamiliarity and inability on an independent basis. The rationale behind the construction and design of this instrument was to correlate responses and identify common patterns of need.

Questions were intended to augment data acquired from general survey, but were more specific in nature to provide precise information regarding confidence or competence. The questionnaire further allowed for analysis and interpretation according to success rates by subject (reading versus math) on an individual, grade level or large group basis. Comparative data via the scale format was easily determined and tabled through a process of item analysis, while the narrative statements were utilized in evaluating success rates of training sessions.

In addition to assessment of the frequency with which teachers use the diagnostic reports as provided by the software, the questionnaire addressed the expertise or computer literacy of the teacher as related to skills necessary for appropriate utilization and integration of computers. Three ratings comprised the scale, including "Significant, Satisfactory, Inadequate" while two further questions required teachers to indicate the number of courses or inservice credit applications experienced within the past three years. This data was especially useful for determining peer group training arrangements, and its inclusion was intended to provide insight as to future needs of the staff.

Of special significance was a six-part question on the questionnaire that consisted of a variety of closed-ended statements that attempted to differentiate the respondent's mindset or attitude toward the potential or uses of computers from pedagogical standpoints. The indicators for this question ranged from belief that computers were "More", "Equally", or "Less" effective than teacher directed lessons as well as useful applications that ranged from "Supplementary", "Replacement", or "Auxiliary" to teacher directed instruction. Values for each indicator ranged from one through five with a rating of "One" designated as "Strongly Agree" and "Five" as "Strongly Disagree". Below each of the questions was a space for additional open-ended comment or explanation. Estimated time for completion of the entire instrument was approximately 20 minutes.

CHAPTER IV

SOLUTION STRATEGY

Discussion and Evaluation of Possible Solutions

The problem of elementary teachers' inability to exploit the potential of computer-based learning experiences was resultant from discomfort or lack of skill in the use of instructional technology, and solutions to the problem of effective integration and implementation of computer applications in the elementary school were vast and varied. However, strategies for improvement reflected the common element of the importance of identifying the role educators want technology to play in the development of effective instructional improvement.

Among the essential factors contributing to successful implementation as consistently found in the literature were appropriate planning processes, adequate inservice training and professional development of teachers. Much emphasis was placed on active rather than passive teacher involvement in implementation processes,

as well as the utilization of meaningful hardware/software configurations founded upon sound pedagogical standards.

According to Barbour (1989), Levinson (1990), McCarthy (1988), Pogrow (1986), and Sherry (1990), effective integration is dependent upon strategic planning processes that begin with a needs assessment to identify critical problems and that includes and involves the teachers in a negotiated decision making process. Particularly, instruments of this nature can be used for the identification of problematic curricular or instructional areas that have "defied traditional teaching remedies". Thus, determining technological directions is a necessary procedure in proper integration and designate the point at which the computer should be introduced into the curriculum (Barbour, 1989, p.4; McCarthy, 1988).

Barbour (1989), and McCarthy (1988) describe the effectiveness of any technological solution as being reliant upon the acceptance and support of the instructional staff through a method of establishing teacher leadership and ownership in the project. Positive teacher response to and support for the use of instructional technology, therefore, can be acquired through effective school-based planning. The goal of the interactive planning process should be to create a "technological blueprint that addresses specific

problems at hand in a way that is acceptable to teachers (Barbour, 1989, p.5)." Additionally, the planning process must be based upon what the teachers want and need with a focus upon how computer technology can provide the solution to instructional needs (McCarthy, 1988). To further solidify the inclusion of teachers in an effective form of strategic planning, Pogrow (1986) states that learning improvement results from appropriate use of computers as generated by a process of establishing a consensus for change. Hence participants schoolwide are involved in the planning and decision making, thus, leaving a lasting impact upon the change elements selected and implemented.

Provision for inservice training and staff development that takes the form of effective integration methodologies as opposed to technical operation leads toward greater degrees of teacher acceptance, changed attitudes toward tne the benefits of computer applications, and more effective implementations (Barbour, 1989; Fulton, 1988; Henderson & Maddux, 1988; McCarthy, 1988; Moursund, 1989; Revenaugh, 1989; Sherry, 1990). Regarding the nature of teacher training, Henderson and Maddux (1988), Moursund (1989), and Revenaugh (1989) recommend frequent, small group, short session inservice. Provided initially on a basis whereby teachers elect to participate, voluntary rather than

mandatory attendance is considered as crucial to success. Fulton (1988), McCarthy (1988), Moursund (1989), and Sherry (1990) all purport "hands on" training experiences that are sensitive to the participant's level of computer competence are taught by credible instructors (generally peer teachers). Content should focus upon the processes of customizing and integrating technology within specific curricula. Following the training sessions, teachers must be provided with practice opportunities to enhance newly acquired competence and confidence. Appropriate to the delivery of technology training seminars, McCarthy (1988) advocates an approach which utilizes other teachers for the delivery of the inservice as best for credibility. In contrast to the common use of external computer experts for training purposes, internal personnel are valuable in establishing a sense of collegiality among participants in a non threatening situation.

According to McCarthy (1989), Moursund (1989), and Sherry (1990), adequate inservice training is comprised of approximately five to ten concentrated training sessions accompanied with ongoing follow-up training and support systems throughout the year thereafter. Thus, considering the varied recommendations found in the literature a formula for effective teacher training would incorporate elements as listed in its design. Moursund (1989)

specifically discusses a model of effective group inservice for computer usage which includes the crucial elements of formative and summative evaluations provided throughout multiple session inservice with provision for implementations between sessions. Revisions to the design of training sessions are, therefore, appropriate and meaningful to the participants. Flexibility with respect to the learning experiences provided during training further facilitates intended outcomes, allowing group leaders to better meet the needs of the audience.

The role of the teacher in the implementation of computer technology, that is, the teacher's active involvement in the selection, prescription, and management of specific computer-based learning experiences is a major determinant of successful outcomes with respect to improved instructional effectiveness (Barbour, 1989; Dalheim, 1989; Levinson, 1990; Pogrow, 1990; Rickelbaum & Henk, 1990). With specific reference to the outcome effectiveness of an applied integrated learning system (ILS), Barbour (1989) and McCarthy and Revenaugh (1989) discuss the success rates of teacher involvement and active programming. Studies of elementary schools utilizing ILS programs yield high degrees of effectiveness through a process of coordinating lessons provided on the

computer-based ILS with direct classroom instruction. In support of the advantages of active teacher selection of computer-based activities, Barbour (1989) describes teacher empowerment facilitated by implementation designs that provide for teacher input and prescription of specific computerized instructional lessons. Serving as an instructional tool, the computer serves as an enabler to the teaching-learning process, especially when managed by the teacher. McCarthy and Revenaugh (1989) recommend basic skills instruction via the computer as prescribed by the teacher to customize and individualize instruction that is relevant, appropriate and based on needs of the student. The job of the teacher becomes easier when the responsibilities of teaching can be shared with another - in this sense, the computer as a teacher. When teachers employ instructional technology to create structured, yet flexible lesson sequences that correlate to the curricular objectives, teachers maintain control over the learning processes and this direct, active involvement will lead toward effective integration and improved instructional effectiveness (Dalheim, 1989).

Levinson (1990) compares effective computer applications with a study of a voucher system experiment and describes the changing roles of both students and

teachers with respect to management elements of classroom instruction, the learning of new skills (those of coach and facilitator), and the capabilities of technology to enhance the power of the teacher. If teachers are to view changing roles as a result of effective integration of instructional technology, then traditional attitudes or "technophobia" must be changed. A change in teachers' prevailing beliefs about computers should, therefore, be a consideration in planning for content of teacher training programs. Teachers can develop an understanding that computers will not likely replace the teacher, but serve as a tool to enhance teaching and learning.

Another important element for establishing effective integration is the idea that computer use with respect to configuration must be coupled with an appropriate theoretical framework which provides a correlated rationale between learning goals and instructional activities (Vockell, 1990). This means that the housing or location of the computers must be driven by identified needs and desired outcomes for the use of instructional technology. Barbour (1989), Foote (1989) and McCarthy and Revenaugh (1989) maintain that placement of computers in the classroom, not in central labs, provides teachers with opportunities to work and interact with students in

smaller groups and makes the teaching-learning process more individualized, thus, more effective. Additionally, classroom placement connotes the computer as a classroom material or teaching tool much like a film strip projector, cassette recorder, or textbook. In contrast, November (1989) argues that the configuration or distribution is not the key to success of computer applications, but rather, the management of the technology as driven by educational philosophy that is crucial.

One method of using computers to enhance learning as described by Pogrow (1988), involves arrangements of clusters of computers in several classrooms within a multi-grade facility. Select software provides extensive access in particular content areas and across varied grade levels that is geared toward accomplishment of a specific improvement objective. Teachers assume a cooperative and collaborative responsibility for the use and management of the clusters, that range from four to eight computer units. Teachers demonstrating high levels of comfort or skill share in the process of helping those with less than adequate abilities.

In a comparative study of several styles or configurations, Barba (1990) explains advantages and disadvantages of the computer lab, the one-computer-in-a-

classroom configuration, and the mini-lab design and reports positive outcomes of a study that addressed the effectiveness, amount of usage, types of activities, and time spent by teachers in the implementation of a computer mini-lab. Described as a mobile cluster of computers that teachers reserve from the media center, the mini-lab is transported from classroom to classroom upon request. Teachers assign small groups of students to the mini-lab, in a style similar to a learning center approach. Students rotate through the mini-lab center as part of the daily classroom routine.

Among other ideas that would contribute to the solution are provision for administrative support and funding, teacher incentive and reward, and the possibility of a mini-lab configuration within a central lab facility. The support and enthusiastic interest of the building principal will inculcate teachers with a sense that effective implementation is an important schooling process that will benefit both teachers and students. To facilitate teacher skill and eventual comfort levels, support networks could be designed to provide individual assistance to teachers in need of additional training, practice or competence. Leading toward a sense of self-confidence and acceptability, teachers could help to

train others in a peer-tutorial mode. A resource section in the library or an implementation manual that is school site specific could be created and made available to instructional staff.

Staff excitement and participation can be enhanced or facilitated through the realization that computers are not an unnecessary add on to an already overly demanding curriculum. Through a school site incentive program, teachers could earn classroom computers through participation in initial inservice and through extended implementation practices. Surplus computers could be redistributed for this purpose. Additionally teachers could receive personal recognition by providing inservice sessions to colleagues, or be provided with compensatory time off as a result of extra time spent in training.

Rather than sending an entire class to the central lab facility (necessary for security purposes) while the teacher is provided with planning time, small groups of six to eight students from various classrooms and differing grade levels could be scheduled on a daily rotational basis, thus reducing class size while maintaining small instructional skill groups among the 20-30 students in a class. Scheduling of the lab would be more flexible, accommodating students more frequently on a

weekly basis, without "down time" during lunch or recess. By shortening the length of time in the lab from a full period when scheduled as a special to a half period, students are availed with twice the original number of exposures to computer-based learning experiences. Teachers can preplan and select appropriately correlated lessons up to a month in advance through the prescription of individual learning pathways via the ILS computerized management system, while the lab attendant can provide technical support and answer operational questions during contact time. As a result, students maintain higher amounts of engaged academic learning time while at the computer work station, and teachers need pay little attention to technical difficulties that naturally impede the flow of instructional events.

Among the solutions to the problem of improving elementary teachers' comfort and skill in the use of instructional technology, thus, improving teachers' ability to exploit its potential for enriching learning experiences, all of the teacher training components were seen as viable and necessary. Available school site human resources were able to meet the needs for planning and leadership, and faculty meetings as scheduled by the writer were devoted to this enterprise. Content of the

training sessions was designed to include all effective suggestions or elements as discussed in the preceding sections.

Considering solutions based on distribution of the computers, the mini-lab appeared well-suited to practicum outcomes. Since mobile units required storage capabilities, the concept of mini-labs within the 24 station central lab seemed feasible and directly related to project outcomes. A change in scheduling was necessary, but reduced classroom pupil/teacher ratios appealed to the teachers as students rotated through the lab for computer-based learning experiences from reading or mathematics. In comparison, the classroom distribution was not attractive in that it may not have yielded anticipated outcomes as there was no guarantee that the work stations would actually be used.

To support and facilitate attendance and participation in teacher training sessions, the suggested incentives were implemented with ease. In addition to five surplus Apple IIE models with accompanying software, parents have donated older models upon purchase of another, and the parent-teacher organization has raised funds for the purchase of educational technology. Options for selection within specified budgetary limits were provided to participants.

Description of Selected Strategy

The rationale followed in the selection of a solution strategy was founded upon teacher change and was comprised of the development of a strategic planning committee, provision for inservice training with implementations between sessions and a redesign of the computer configuration and scheduling of students which addressed the problem of ineffective integration and extension of classroom instruction. Teachers from each grade level, one through five, were invited to voluntarily participate in the decision making process with regard to utilization of computers in the instructional process. The results of the strategic planning contributed to project outcomes involving the number of computer-based exposures students received weekly, effective teacher utilization of computers, and teacher attitude toward computer applications. The planning process articulated how the computers were to be used to achieve school-based outcomes. To date, the school has investigated various integration procedures, but has not definitively structured a strategic plan for the use of instructional technology. This element of the practicum implementation

served as a framework for current use and future evaluation.

Beginning with a needs assessment, the planning committee identified and isolated curricular areas where traditional teaching methods have proven difficult or ineffective as well as those areas where positive outcomes have been noted as a result of computer-based learning experiences. Considering the needs, the committee evaluated the degree to which existing computer related technology would meet these needs by formulating goals, objectives and action plans that incorporated the multiple computer hardware and software available. Through active participation in the evaluation and formulation of a long range plan, the involvement of committee members as representative of the instructional staff, improved support, acceptance and ownership of the process of integration. It is generally agreed that the schools cannot effect change on a mandatory basis. Teachers will not do something that is not owned, and cannot own something that is not understood. Thus, the exploratory nature of the planning process served additionally as a vehicle for teacher education as to the benefits of appropriate computer applications.

Concurrent with the formulation of a long range plan,

the planning committee related objectives and action plans to the philosophy of the school. Careful attention to the mission statement led toward plans that were reflective of small group instruction on an individualized basis, and that were commensurate with the cluster style or distribution. The recognition of the capabilities of the computer as an instructional tool much like a learning center, as opposed to a distinctly separate educational experience was resultant through the total planning process, and led further to a change in teachers' attitude toward instructional technology.

A comprehensive training and staff development program consisting of six to nine hands-on workshops each approximately two hours in length was designed, facilitated and led by the writer, the school computer specialist, and two classroom teachers who have demonstrated effective applications of computer technology. On a consultatory basis, the software vendor client support staff initiated provision for adequate curricular training. The training held the potential to reduce teachers' anxiety and technophobia, and improve active involvement leading toward accomplishment of objectives dealing with provision for direct input and prescription of computer-based learning experiences,

effective teacher utilization of computers, and teacher attitude toward computer applications.

A primary focus of the inservice training was on effective integration procedures that correlated with the school philosophy and that were driven by the needs of the classroom teachers as collected by pre-implementation assessments. This data identified teachers' current levels of functioning as well as specific operational procedures in need of improvement. By tailoring the content of the small group sessions to common needs of the participants, the inservice training was relevant and provided practical as well as theoretical significance. Attendance at training sessions was encouraged but not mandated and was provided in the computer lab in small groups of 12 to 15 participants per meeting.

General content of the workshops included instruction in the use of instructional technology with a focus upon the capabilities of computer-based learning experiences. To effect awareness, the use of a variety of available software programs in addition to the lessons included in the scope and sequence of the available ILS was incorporated within the training sequences. The use of the management system for prescribing individual learning sequences was developed through hands-on practice. Finally, the effects

of active teacher involvement followed by simulated practice in implementing the skills presented in the training sessions allowed for transfer of training.

Compensatory time was granted to participants who completed the training process and was accompanied by a competitive incentive. The motivation allowed each of the grades, comprised of four teachers, to accumulate up to 150 hours of combined computer "time" that could be redeemed for one of five extra computers, distributed with software to classrooms for teacher use.

The configuration and scheduling of computers was redesigned to approximate a cooperative mini-lab or cluster arrangement whereby six to eight students from three or four various classes rotated through the lab approximately every 25 minutes during instruction in reading and mathematics at least four times per week. The small group represented one of three or four instructional skill groups from a teacher's assigned reading and mathematics class, while the computer-based learning experience served as one of three learning activities during the period. The learning center approach as facilitated by the cluster concept reduced the remaining student/teacher ratio in the classroom to approximately 15:1. This design, therefore, had the potential to

facilitate personalized instruction for students both while at the computerized work station and in the classroom. Results included a doubling of the amount of direct, interactive instruction, with the effects of improved classroom management through increased, engaged academic learning time.

Report of Action Taken

To initiate the three month implementation, the writer solicited planning committee members (see Appendix B) and prepared written procedural guidelines for completing effective strategic planning (see Appendix C). The solicitation memo, sent to all faculty and staff explained the purpose of the strategic planning process with respect to effective computer integration. The committee met a total of six times during a three week period, and discussed priorities through a process of identifying needs and formulating goals for the use of computers. This was considered Phase One of the three phase project.

Following an analysis of current conditions of use,

the strategic planning committee identified the role instructional technology was to play in the teaching-learning process. A written statement of intent that described the function of instructional technology as an organic element was constructed as an overall goal for the use and integration of computer-based learning experiences, and was stated as follows:

> ...to utilize computer related instructional technology to enhance the student's opportunities for the development of basic skills and critical thinking abilities through provision for increased active teacher and student responsibility for the teaching-learning process.

The generated statement of intent was considered the driving force for the development of specific objectives and process guidelines, designed in a step-by-step, action oriented, procedural plan (see Appendix D). Each of the four objectives and accompanying action plans were designed to facilitate teachers' improved comfort and skill with the use of instructional technology and to lead toward realization of the general goal. Directions as

expressed in the objectives and action plans were noted by the writer for inclusion in training sessions, and following revision and modification, the written recommendations were disseminated to all faculty and staff.

Then, based upon the data compiled from pre-implementation questionnaires and problem documentation instruments that served as a needs assessment, the writer designed and prepared a general content outline for training sessions (see Appendix E). The writer included and incorporated input from potential workshop leaders (computer specialist, peer teacher experts, and vendor consultant) to prepare a weekly program that was appropriate and attentive to the goals of the project and the individual needs of the participants. Each intensive training session, approximately two hours in length was repeated twice weekly during a six week period at convenient times as identified by the faculty. Some elected an early morning presentation while others preferred an after-school schedule. The six week, instructional or training segment of the project was considered Phase Two, and training content and methodology were delivered via the "Technology Training leader's Manual" (see Appendix F).

Using the content outline as a curricular scope and

sequence the participating workshop leaders, in a role of primary technicians, planned sessions that specified topic, outcomes, methods and materials. This group was comprised of the writer, the software vendor consultant, the school computer specialist, and two classroom teachers who had shown both interest and expertise in the use of instructional technology. Serving as an initial core committee, differentiated from the strategic planning group, the members functioned as a council of engineers in developing the programs that were delivered. The identification of this group served as a foundation upon which the project was built and expanded as the group sought to lead by example.

Anticipating that the scheduling process of Phase Two would present difficulties due to absence or the need for teachers to respond to spontaneous school related matters, various members of the council arranged for tutorial sessions or makeup trainings on an individual, as needed basis. This process helped in maintaining separate groups of 12 to 15 teachers each and eliminated the potential for over crowded sessions, particularly in the afternoon meetings.

Eventually resultant in a "Technology Leader's Training Manual" (see Appendix F), the lessons as designed

partially in advance, and revised or modified on an ongoing basis through formative evaluation, focused on a combination of theoretical and practical information coupled with hands-on applications of newly acquired skills. Thus, the manual is representative of six specific instructional sequences, correspondent to each of the weeks, four through nine, of the implementation period.

The first training session (Week Four) involved training in the understanding and use of computers as an instructional tool to enhance teaching and learning through a combination of presentation of information and practical simulation and application. The use of select software and the use of a data projection panel motivated participants as to the effectiveness of computer applications. Specific strategies included a study of the historical perspectives of instructional technology through a consideration of the teaching machines of the 1960's, of the early software programs and practices, and of the more recent developments and improvements in computer related technology. Presented in a large group lecture/discussion format, the program challenged participants to examine, compare and contrast traditional educational frameworks with those that allow for the use

of instructional technology. A primary focus was placed on the use of the computer with multiple instructional models that included cooperative learning, Socratic discussions, lecture presentation, and individualized or prescriptive methods. The first session concluded with hands-on activities as participants experienced and analyzed particular software programs from a pedagogical basis to begin thinking about general curricular applications.

During the second training session (Week Five), the various capabilities and implementation approaches of computers to enhance learning were developed through the presentation of research findings and multiple hands-on explorations. Participants were acquainted with the varied purposes of use that ranged from remedial to enriched applications as well as with the array of basic skills, higher order thinking skills and creative problem solving abilities that can be facilitated through computer-based learning activities. Teachers further explored the potential of instructional technology to facilitate student progress through discussions concerning learning styles and multiple intelligences. The second session incorporated the commanding nature of small group investigation and hands-on experiences and concluded with

participants' assessment of possible uses for large units of study or applications through a thematic focus. Particular applications and teacher testimonial acquainted participants with the benefits and effectiveness of documented usage, leading toward both an awareness and sense of ownership of the technology. Additionally, a formative evaluation was conducted (see Appendix G).

The program for session three (Week Six), involved a detailed hands-on investigation of existing available software with a focus upon the theoretical framework behind the delivery of the lesson. Teachers explored integration possibilities and instructional development for the purpose of correlating software with the classroom curricula. Specifically, the content of the session focused upon identifying the contributions of the computer to curriculum and instruction. Participants were exposed to a new definition of curriculum for application of the computer as proposed by Shane (1987, p. 72):

> The curriculum is a written document that outlines suggested learning experiences but also recognizes individual differences in a given age group.

> The curriculum reflects a consensus among faculty as to the scope and sequence of various learnings and includes ways of introducing learners to the values of a given culture. An effective curriculum results in desired changes in an individual's social, psychological, and intellectual behavior.

Participants also acquired information regarding the ways in which the computer can facilitate instruction, including areas such as attention to individual needs, assessment possibilities, and supplementary, out-of-classroom opportunities. Additionally, teachers explored integration possibilities for the major academic areas of reading, language arts, and mathematics with a focus upon Whole Language experiences. Incorporated within the training was formal teacher evaluation of a variety of software programs and/or ILS lessons. Software evaluation forms (see Appendix H) were shared among participants.

The redesign of the computer lab facility and

schedule commenced during the sixth week of implementation. A multi-age or multi-grade cluster approach was established for grades one through five by the computer specialist, the grade level team coordinator, and the writer to accommodate each of the teacher's three small groups in reading and mathematics for a minimum of four weekly computer-based experiences. To enhance opportunities for active involvement at an early stage in the training process, teachers were provided with record keeping devices and request forms that coordinate the programming process on an individual or small group basis (see Appendix I).

During the fourth inservice (Week Seven), participants explored the nature of the ILS and the scope and sequence of the curriculum. Suggestions for use were developed in addition to inclusion of off-line materials by means of correlating classroom materials with specific grade level computer-based lessons. Participants were provided with on-site materials traditionally employed in the teaching-learning process, i.e., basals and core curricular texts for reading, language arts and mathematics, curriculum guides, and monitoring checklists. Given a copy of the host of skills provided by the ILS, participants compared and contrasted the scope and

sequence of each. Particular focus was placed upon the minor learning objectives delivered within the context of an isolated skill presentation. Using the provided scope and sequence of the ILS, participants recognized the developmental nature of the program, noting the power such systems hold for combining (integrating) many skills and processes that are traditionally taught as separate entities. Each participant, either individually or in small groups, was encouraged to design a written sequence of computer-based lessons that correspond to content oriented or thematic units of study, as well as design or recommend accompanying off-line, hard copy materials that could correlate and augment the electronic experiences selected. Individual activities demonstrated and allowed for the design or suggestion of auxiliary computer related experiences.

During session five (Week Eight), the inservice training consisted of precise hands-on training in the operational procedures and usage of the management system. The intent and focus of learning activities was upon equipping participants with the theoretical and practical skills necessary to prescribe individual lesson formats in a structured sequence that were a direct extension of classroom learning experiences. Of major focus were the

mechanical and technical procedures necessary to effectively operate the hardware components of the network. Additional attention was given to the processes of requesting, printing, and interpreting diagnostic reports. Teachers referenced generated unit plans, the school curriculum guides, and commercial product teacher manuals to design simulated computer-based learning experiences for individuals or small groups of students that corresponded to preplanned classroom events in reading, language arts, or mathematics.

The instructional focus of the sixth session (Week Nine) was geared toward establishing the positive effects of active teacher involvement in the integration of computers. Introduced to the participants were elements of teacher empowerment, increased student achievement, reduced pupil/teacher ratio leading toward improved classroom management, heightened sense of teacher self-esteem, and professional opportunities made possible through the use of computers. Especially highlighted were educational reform efforts that call for increased teacher professionalism and empowerment as made evident by this computer application to facilitate changing teacher roles to those of mentor or coach, to free the teacher from mundane clerical duties or behavioral enforcement, and to

provide staff development responsive to needs as well as to promote personal growth and expertise. The session concluded with the administration of another formative evaluation. Results of the formative evaluation were analyzed as to modifications or revisions to the training component that might result in increased effectiveness of workshop delivery.

The activities for Weeks Ten through Twelve involved provision for simulated practice, additional individual assistance and instruction, initial applications in transfer from the computer specialist's prescription of lessons to the teacher's active involvement, follow-up and extended training on existing peripheral equipment and summative evaluation. Reassessment of computer integration and implementation by means of post-implementation observations, interviews, and questionnaires occurred after 12 weeks of program implementation.

CHAPTER V

RESULTS, DISCUSSION AND RECOMMENDATIONS

Results

A process of improving teachers' comfort and skill with instructional technology, thereby heightening their ability to exploit the potential of computer-based learning experiences as an enriching and effective instructional tool required comprehensive pre-planning as to the role of technology followed by specific training in the integration of technology. The problem involved a means of overcoming teachers' technophobia and traditional mindset toward the application of computer related learning experiences through the design and presentation of meaningful and appropriate school-based training sessions and hands-on workshops that were attentive and responsive to the individual needs of the participants.

Project outcomes were designed to evaluate the success and effectiveness of the practicum implementation

and were geared toward establishing positive change in teachers' behavior and attitude with respect to integration of instructional technology. It was expected that following the implementation period, elementary students would be provided with computer-based learning experiences at least four times weekly as an extension of and integrated within reading and mathematics instruction. A post-implementation systematic observation conducted by the writer indicated that on a schoolwide basis, students were channeled to the computer lab twice weekly during reading instruction and twice weekly from mathematics. Tallied on a daily basis, the frequency with which students received computer-based learning experiences as well as the number of times that the electronic activities correlated to classroom instruction was compiled to reveal successful accomplishment of the anticipated goal. This objective was achieved through a restructuring and rescheduling of the prior computer lab operation from a 50 minute, seven period daily schedule to 14 daily sessions each 25 minutes in length. Additionally, each session allowed for 28 students, but rather than sending an entire class to the lab, small instructional groups from various grades and classes were scheduled on a rotating basis.

Comparable to a learning center approach, students

from all grades moved to and from the computer-based learning experience, direct instruction, independent projects or activities, or cooperative learning situations during reading and mathematics on a daily schedule, thereby receiving twice as many contacts as before implementation as well as extending the learning experiences of each particular subject area. Relieving the burden of a master, schoolwide schedule that accommodated large groups of students while the teacher was provided with an instructional planning period, the shortened sessions were further scheduled by "block", each of three blocks representing a cluster of eight computer workstations to which small instructional groups could be assigned. Thus, the objective of increasing the frequency of student exposure to computer-based learning experiences as a direct extension of classroom instructional activities by a 100 percent increase of prior instances was successfully effected.

Another project outcome addressed the need for teacher involvement in the planning and provision for integrated computer-based instruction. It was anticipated that after implementation, all 27 elementary school teachers would provide direct input, prescription, or suggestion as to provision for computer-based learning

experiences for their respective reading and mathematics classes (integrated approach) during a typical weekly schedule. A post-implementation interview between the writer and the computer lab attendant showed marked improvement in comparison to pre-implementation data. Through direct observation and anecdotal record, the lab attendant was able to document increased active teacher involvement in 16 out of 19 cases of absolutely no involvement whatsoever. The initial eight teachers who were previously involved heightened their active efforts of integration through new and innovative processes as noted in the lab attendant's informal anecdotes that were compared to previous recollections. Overall, 24 out of 27 teachers were noted as actively involved on a weekly basis in the prescription of individual student learning experiences while at the computer, indicating that 89 percent of the teachers were involved with an improvement of 59 percent response over the original 30 percent noted prior to implementation. Although short of its anticipated outcome of 100 percent involvement, the positive change as seen was favorable and considered significant.

Concerned with addressing teachers' effective utilization of computers, a third practicum objective

sought to increase both skill and comfort with integration processes leading toward heightened implementations of instructional technology. It was expected that following the implementation, at least 20 of the 27 elementary teachers would self-evaluate personal effectiveness with respect to utilization of computers as at least "Above Average" from among indicators on a school-based teacher performance evaluation with a minimal global improvement rate of 30 percent positive response in all 13 cases of prior negative evaluation. Comparative results indicated that global outcomes surpassed the anticipated levels of effectiveness via the self-report. The pre and post-implementation calculation of positive response according to select, purposeful application is shown in Table 2.

Table 2

Comparative Personal Effectiveness

Behavior	Degree of Effectiveness					Percent Positive
	O	AA	S	NI	U	
Integration	1/7	5/9	8/8	5/2	4/1	26/59
Prescription	Ø/6	3/12	8/5	9/1	3/3	13/67
Communication	4/12	3/1Ø	12/4	2/3	2/Ø	3Ø/81
Knowledge of Hardware	3/7	5/6	1Ø/12	4/2	1/Ø	35/48
Operational Procedures	2/5	2/9	5/8	11/5	3/Ø	17/52
Overall Effectiveness	2/1Ø	8/12	6/4	7/1	Ø/Ø	43/81

n = 27 X = 27/65

Calculating global, schoolwide improvement of self-assessed performance, results indicate significant increases on all indicators with an improvement in the

mean rate of positive response of 35 percent. These results suggested that as a whole, the faculty viewed their personal effectiveness in the ability to utilize computers as positively affected through implementation services. The global analysis further allowed for identification of specific areas as expressed by the indicators of greatest growth and improvement, indicating the most improved aspects to be the selection of activities based on individual needs (operationally defined as "prescription") and the amount of active involvement or communication with the lab attendant (operationally defined as "communication"). Teachers' general knowledge of functional elements of computer hardware was the area of least improved effectiveness.

An analysis of individual self-ratings as expressed on the annually administered performance evaluation indicated that in comparison to 13 teachers' negative response to "overall personal effectiveness" prior to implementation, 22 out of 27 teachers consider their ability to effectively apply computer-based learning experiences as in positive ranges of behavior described as being "Above Average" or "Outstanding". These results were reflective of heightened levels of effectiveness with a marked increase of 38 percent positive response, yielding

data that indicated 82 percent of the teachers as perceiving their levels of ability as positive, and was considered implicit of improved comfort and skill with instructional technology. Of the original 13 teachers perceiving their effectiveness as only "Satisfactory" or less, individual rates of improvement were calculated using the scale of five responses that ranged from "Outstanding" (scored five) to "Unacceptable" (scored one). Computing the degrees of improvement based on an equal interval scale, seven teachers showed a 50 percent gain, five showed improved position by a 25 percent gain, and one teacher showed no change in positive response. Thus, twelve of the 13 teachers who had previously indicated a negative response showed at least an improved positive direction of at least 25 percent. Although not quite at the expected level as stated in the practicum objective, the increase was representative of positive effect as resultant from treatment.

A final project objective was relative to teachers' increased affective response to the use of instructional technology. It was expected that after the implementation period, all of the 27 elementary teachers would indicate positive attitudes toward computer applications as measured by the administration of the post-implementation

questionnaire designed by the writer (see Appendix A) with an increase of at least 14 improved attitudinal responses. Six indicators particularly addressed teachers' beliefs and values with respect to the efficacy of computer applications. Statements ranged from the perspective of computer applications as "equally important and as effective as teacher directed instruction" to the idea that computer-based learning experiences should be applied only as an "auxiliary component of the instructional delivery system". Three indicators connoted a positive stance toward computer integration (see Appendix A, question nine, items "a", "c", and "e"), while the remaining three represented a negative viewpoint (see Appendix A, question nine, items "b", "d", and "f"). Respondents were asked to rate each indicator from a scale of five responses that ranged from "Strongly Agree" (scored five) to "Strongly Disagree" (scored one). It was possible, therefore, to determine both a general consensus as to teachers' affect by comparing mean scores in each of two categorical sets, either "positive" or "negative" as well as response to individual indicator by degree.

Ratings for the three positive indicators were tallied and a mean score of 4.5 derived, reflective of teachers' belief that computer-based learning experiences

are a valuable asset to the teaching-learning process. The mean score for the negative domain was calculated to be 2.1 and shows that teachers generally disagree with beliefs that view computer applications as either unimportant or as a separate entity of instructional procedures. Table 3 provides a graphic representation of teachers' responses to the six indicators on the instrument.

Table 3

Teachers' Attitude Toward Computers

Item	Number of Responses					
Score	(5)	(4)	(3)	(2)	(1)	Tot
	SA	A	U	D	SD	
a. Positive	12	11	3	1	Ø	115
c. Positive	1Ø	1Ø	6	Ø	1	119
e. Positive	17	8	2	Ø	Ø	123
b. Negative	Ø	1	3	11	12	47
d. Negative	1	2	1	13	9	51
f. Negative	1	3	3	6	14	52

Considering the individual indicators as more precise in determining teachers' mindset toward instructional technology, it was possible to determine the degrees of positive reaction to the role of computer-based learning activities. By a process of reversing the low score value of a negative indicator, levels of positive response were computed for each of the six perspectives. The verbiage of the statements further reflected degrees of positive belief, with Statement "C" indicative of the most positive, followed by "A", "E", "B", "D", and "F" consecutively. Given the rating scale of five responses, the mean score of positive response was calculated for items "C", "A", and "E", which were considered positively stated. Statement "C", belief that computer-based learning experiences are often "more important or effective than teacher directed instruction" evoked a mean response of 3.9. A mean of 4.3 was calculated for Statement "A", belief that computer-based learning experiences are "equally as important or effective as teacher directed instruction", while Statement "E", belief that computer-based learning experiences can "replace certain types of teacher directed instruction" drew a mean score of 4.6. These scores were indicative of teacher attitude toward computer applications that was clearly

positive and reflective of an improved and changing mindset toward the use of instructional technology. The remaining three statements, "B", "D", and "F", ranging from belief that computer-based learning experiences are "less important or effective than teacher directed instruction", to use as a "supplement", and finally, as an "auxiliary component to traditional instructional methods" evoked mean scores respectively of 4.3, 4.Ø, and 4.1.

Employing the same technique on an individual teacher basis to determine the number of teachers responding in positive levels, means ranged from the lowest score of 3.5 to 4.8, indicating that the objective of having all 27 teachers respond with positive attitude toward computer applications was successfully achieved, and that of the 14 teachers responding negatively prior to implementation, all indicated improved affective response.

Discussion

Among the most informative aspects of this practicum was the interpretation of pre and post-implementation questionnaire data. Designed to provide augmented and

corollary information to outcome measurement instruments and to suggest specific learning experiences for inclusion in training sessions, the questionnaire allowed for a detailed analysis of a variety of overall conclusions and offered insight as to the nature or causal factors associated with the respondents' indications.

Questionnaire data as collected confirmed and collaborated the number of weekly computer-based learning experiences provided to students as ranging from four to five sessions per week depending upon the availability of access time and vacant stations during a scheduled session. It was noted from the comment section on the questionnaire that the most common application involved individual student assignment to a workstation when compacted from regular classroom instruction or when a student had completed his or her assigned tasks. In most cases, the fifth contact session was delivered as an enrichment activity or for word processing opportunities. Seen as an extension of the classroom instruction whereby students applied learned capabilities associated with instructional technology (type reports, take spelling tests, generate data bases or spread sheets, etc.), this experience was deemed as effective application of computer-based learning experiences.

In analyzing the data with respect to the outcome objective dealing with increased active teacher involvement, it was found that three of the four teachers in one particular grade, third grade, were those who demonstrated no involvement at this time. It was further determined by post-implementation questionnaire response, that one of the three, new to the faculty, and a first-year teacher, and the other two veteran teachers had received no inservice training prior to implementation, nor had they taken any computer related courses during the past three-year period. Referring back to records kept by the writer during implementation, it was also found that each of the three teachers mentioned missed at least one of the major training sessions provided through this project. Although presented at a later time on an individual basis, it may be that the make-up session was lacking in depth or substance in comparison to the formal program, thus, contributing to the teachers' reticence at the later point.

Further associated with the prescription of computer-based learning experiences as expressed in practicum outcomes was the nature of teacher input according to subject area. An interpretation of the data provided by the lab attendant according to grade level

input and by subject area of involvement showed that teachers in grades one and two were more active in prescribing reading and language arts lessons, while those in fourth and fifth grades were primarily concerned with mathematics.

This finding was determined by calculating the mean rate of prescription by subject area for each grade. An analysis of grade one applications showed that of the recommendations given, 70 percent of the lessons prescribed for children were for reading. Eighty percent of the grade two prescriptions allowed for integration of reading experiences. Conversely, 65 percent of the fourth grade teachers', and 80 percent of the fifth grade teachers' prescriptions related to mathematics. One explanation for this disproportionate rate of application may be due to the nature and content of the programs presented at these grade levels coupled with teachers' individual teaching styles and particular student needs. Of primary focus in the early grades has been the development of reading and language arts, while the goal of mathematics instruction has been to establish a firm conceptual basis for future proficiency. On the other hand, at the upper levels, students have generally mastered the fundamentals of basic reading and have been

performing in stages of the reading process that require the ability to "read to learn". Mathematics programming has continued to build upon previously learned concepts, hierarchial in nature, thus demanding continued basic skill development in contrast to the refinement process associated with reading and the language arts.

One practicum objective was concerned with teachers' global self-assessment of effectiveness with respect to computer applications. An analysis of the annual teacher performance evaluation indicated teachers' general knowledge of functional elements of computer hardware to be the area of least improvement, and may be explained by the focus of training sessions upon effective applications of extant software and by the realization that teachers evidence less interest or need associated with mechanical operations, and view the presence of the lab attendant as attentive to technical needs. In addition, it was apparent that the operational procedures of the hardware components as required for access to the software management system required no computer-specific language, background, or expertise: the system can be accessed through simple commands and procedures via "help menus" on-screen.

Of particular interest in the interpretation and

analysis of results was teachers' response to a six part indicator on the questionnaire (see Appendix A) that assessed affect toward the role and importance of instructional technology. Concerned with effecting a change in predetermined attitude toward computers, the practicum sought to heighten teachers' acceptance, comfort and skill in the use of instructional technology as an integral component to the teaching-learning process. Of the six statements, the lowest mean score derived was 3.9 in response to the belief that "computers are more important or effective than teacher directed lessons". It is interesting to note that during practicum implementation, the writer recorded teacher comments that were directed toward computer presentations that "Do this better than I ever could", or "This alleviates all of that fancy motivational stuff", yet, teachers did not respond to the particular indicator with high degrees of positive response. It may be that they were still reluctant to displace the responsibility of learning to mechanical devices and still felt to certain degrees that the students were dependent upon them for their learning. This is a concept that is well-entrenched in the profession of teaching and is considered difficult to overcome on such literal terms. However, considering the

mean of 3.9 as representative of "Agree" levels of acceptance, it seemed possible that teachers were perceiving computer-based learning experiences as more viable than before implementation for purposes of developing basic skills and critical thinking abilities.

Additionally, the mean of 4.0 for the indicator associated with teachers' view of computer applications as a "supplement to teacher directed instruction" may have been resultant from many years of previous applications of drill and practice technique associated with the ..ature of early software programs. Considered effective in its time, students were exposed to frequent computer-based learning experiences for the purpose of developing speed and accuracy in basic computational mathematics skills or isolated reading skills. This was the type of software to which the respondents were familiar prior to the practicum implementation, and may have accounted for the reticence to abandon previously established modes of practice.

In summary, the overall success of this project was evident from the data collected. The global outcomes were reflective of positive changes in both teachers' behavior and attitude, and it has been concluded that improved comfort and skill in the use of instructional technology has led to improved and integrated applications.

Recommendations

It is strongly recommended that specific consideration be given to the available on-site software available to others wishing to implement the steps and procedures associated with this project. Although somewhat software-specific in its design, the relative elements of planning and training are transferable to any situation provided the content of the workshops is adjusted according to individual need. Ongoing maintenance and enhancement training is a crucial element to effective application and integration of computer-based learning experiences. Thus, it will be necessary to assess and provide appropriate and meaningful follow-up and hands-on experiences on a regular basis. Additionally, the strategic planning committee should continue to monitor and evaluate the degree to which objectives and action plans are accomplished, modifying where necessary to effect accomplishment of stated goals.

Dissemination

Among the opportunities for dissemination are presentations at local and regional educational conferences concerned with the application of instructional technology. The 1991 annual convention hosted by the Florida Council of Independent Schools will feature two presentations as a result of this practicum. The presentations, delivered by the writer will focus upon effective strategies for providing on-site computer training for the effective integration of instructional technology, focusing upon the role of effective strategic planning and provision of meaningful training using those individuals on-staff who can serve as peer-tutors. Recognizing the need of the private sector schools of providing their own training components, both administrators and teachers will find the presentation helpful and informative, while the dissemination of the "Technology Leader's Training Manual" (see Appendix G) provides a detailed sequence of workshop methodology.

Additionally, the manual will be shared with other campus affiliated schools that will find the contents useful in the provision of on-site training. Among the

recipients are four different educational facilities associated with the university, ranging in grade levels pre-kindergarten through twelfth grades and dealing with youngsters of varying academic ability and performance.

Finally, elements of training in the use and integration of instructional technology will be shared with the undergraduate program in education. It is hoped that preservice education majors at the University will find exposure to effective methods of computer integration as among appropriate instructional strategies for use in their future teaching careers.

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Appendices

APPENDIX A

TEACHER QUESTIONNAIRE

TEACHER QUESTIONNAIRE

The purpose of this anonymous questionnaire is to determine the nature of computer applications in the Lower School and to assess the extent to which computer-based learning experiences are integrated within the curriculum to augment direct instruction, facilitate small group instruction and meet individual needs.

Please respond to the following statements. Comments appreciated where applicable.

1. During a typical week of instruction in reading, how often do you
   a. prescribe specific computer-based programs for individual student needs? _____
   b. allow the computer specialist to select programs presented? _____
   c. consult the curriculum guide provided by the school? _____; by the computer software publisher? _____; by commercial text publisher? _____

Comments: _____

_____

_____

2. During a typical week of instruction in mathematics, how often do you
   a. prescribe specific computer-based programs for individual student needs? _____
   b. allow the computer specialist to select programs presented? _____
   c. consult the curriculum guide provided by the school? _____; by the computer software publisher? _____; by commercial text publisher? _____

Comments: _____

_____

_____

3. Using the rating scale below the question, number each to indicate to what degree are you familiar with:
   a. the reading software lesson development of your grade level _____
   b. the mathematics software lesson development of your grade level _____
   c. the scope and sequence of the computer software program in reading _____
   d. the scope and sequence of the computer software program in mathematics _____
   e. the procedures for prescribing individual lessons via the management system through the file server _____, at a student work station _____, by means of written request? _____

Comments: _____

_____

_____

1 = confident and competent independently
2 = usually secure; rarely requires assistance
3 = capable with minimal help
4 = somewhat insecure; requires assistance
5 = unsure or unfamiliar; unable independently

4. How many computer-based learning experiences are provided weekly for each student in reading _____, math _____ other? _____: _____

Comments: _____

_____

_____

5. What is the approximate time in minutes of each contact? _____

Comments: _____

_____

_____

6. How often weekly do you utilize diagnostic reports as provided by the integrated learning system (computer software) in planning for instructional needs with respect to:
   a. direct instruction in reading? _____
   b. direct instruction in mathematics? _____
   c. prescription of reading software programs? _____
   d. prescription of mathematics software programs? _____

Comments: _____

_____

_____

7. I would rate my expertise or knowledge of computer literacy as significant _____, satisfactory _____, inadequate _____ as it relates to skills required for appropriate utilization and integration of computers in this setting.

Comments: _____

_____

_____

8. I have taken _____ courses in computer literacy within the past three years.

Comments: _____

_____

_____

9. Using the rating scale below the question, number each. I believe that computer-based learning experiences
   a. are equally as important and effective as teacher directed instruction _____
   b. are less important or effective than teacher directed instruction _____
   c. are often more important or effective than teacher directed instruction _____
   d. should be supplementary to teacher directed instruction _____
   e. can replace certain types of teacher directed instruction _____
   f. should be an auxiliary component of the instructional delivery system _____

Comments: _____

_____

_____

1 = strongly agree
2 = agree
3 = not sure or uncertain
4 = disagree
5 = strongly disagree

10. I have participated in _____ hours of inservice training with respect to utilization and integration of specific computer-based learning experiences and feel I require an additional _____ hours of experience for effective application.

Comments: _____

_____

_____

APPENDIX B

MEMO SOLICITING STRATEGIC
PLANNING COMMITTEE MEMBERS

MEMORANDUM SOLICITING PLANNING COMMITTEE

TO: All Faculty and Staff

DATE: March 11, 1991

FROM: Liz

SUBJECT: Instructional Technology

I would like to establish a committee of faculty and staff who are interested in formulating goals, objectives and action plans for the use of instructional technology in the Lower School. The purpose of the committee will be to engage in a process of strategic planning to develop procedures for the integration and application of technology, specifically computer-based learning experiences.

If you are interested in joining this group, please contact me on or before March 15, 1991 for further information and schedules. Thank you for your participation.

APPENDIX C

STRATEGIC PLANNING GUIDELINES

STRATEGIC PLANNING GUIDELINES

Concurrent with our school philosophy and mission statement, we seek "to enhance classroom offerings through the use of technologies" (Lower School Handbook, 1990).

Your first task is to analyze current conditions. Investigate the nature of extant use of instructional technology by identifying:

1. Usage of computer related technology
   a. What technology is used
   b. For what purpose (how used)
   c. Where used (curricular focus)
   d. Why used

2. Availability of hardware and software
   a. Compile list of resources
   b. Cross-reference with media materials

3. Potential sources for development
   a. School personnel
   b. University network services
   c. Outside vendor client support

Next, you need to consider school-based needs as related to futuristic directions. Determine the role instructional technology will play in the teaching-learning process, a visionary task of insight and creativity. Begin by considering all possibilities through a brainstorm process to generate a list of all or any applications. Then, label as to viability by evaluating potential versus constraints as determined by factors such as cost effectiveness, efficiency, personnel, etc. Label each as follows:

L = Least viable potential
M = Moderate viable potential
G = Greatest viable potential

Finally, construct a written statement of intent that describes the functions of instructional technology as applied in the Lower School.

Utilizing the statement that reflects the position and role of instructional technology, design an overall goal for its use and integration as driven by the philosophy and mission statement of the school. The goal should provide long-term, global direction and serve as a vehicle for measuring overall achievement of purpose and intent. Formulate objectives, measurable and specific which lead toward accomplishment of the goal, and design step-by-step action oriented procedural plans for each. Indicate recommended time frames for completion.

Submit your written analyses using this outline as a guideline that will serve as a foundation upon which future events will be built.

By considering yourselves as "change agents" in this process of participatory decision making, you are in a position to effect the key formulations for the use of instructional technology.

Thank you in advance for your commitment, and "Good Luck!" as you initiate your group effort.

APPENDIX D

GOALS, OBJECTIVES, ACTION PLANS: INSTRUCTIONAL TECHNOLOGY

GOALS, OBJECTIVES, ACTION PLANS: INSTRUCTIONAL TECHNOLOGY

Goal: ... to utilize computer related instructional technology to enhance the student's opportunities for the development of basic skills and critical thinking abilities through provision for increased teacher and student responsibility for the teaching-learning process

Objective No. 1

... to provide ongoing teacher training and inservice programs that will develop strategies for appropriate and effective integration of technology

Action Plans

1. Establish initial and continuing training in the use of existing hardware and software through consultory and on-site personnel
2. Develop cooperative meetings between grades/divisions/sites to share resources and applications of varied technologies
3. Provide release time or nonmonetary compensation and incentive to accompany training participation

Objective No. 2

... to integrate select computer software and the use of computer-based technology into the curriculum and instructional process of reading, language arts, and mathematics

Action Plans

1. Acquaint and familiarize teaching staff with available software programs and scope and sequence of existing integrated learning system
2. Prepare and disseminate catalogue of program descriptions
3. Establish individuals in position of curricular experts or specialists by providing release time for the evaluation of existing software
4. Provide for sharing and testimonial dissemination of information through regularly scheduled monthly meetings

Objective No. 3

... to increase the number of opportunities and learning experiences for students via instructional technology

Action Plans

1. Investigate, design, and implement a configuration of computer usage that allows for application as a learning center (mini-lab, cluster approach)
2. Revise existing schedule to accommodate students in small groups, three to four times weekly
3. Acquire paraprofessionals and parent volunteers to assist in the management of small groups

Objective No. 4

... to utilize computer related technology to increase student achievement and teacher productivity, on-task time and behavior, leading toward improved classroom management

Action Plans

1. Provide multi-age/grade scheduling of computer usage during instruction in reading and mathematics on a 25 minute rotational basis to reduce pupil/teacher ratio
2. Explore applications to reduce the amount of independent seatwork that requires teacher correction, i.e. identify methods that incorporate word processing for spelling tests etc.
3. Provide comprehensive training in the interpretation and application of each type of diagnostic test as provided by the integrated learning system

APPENDIX E

GENERAL CONTENT OUTLINE: TRAINING

GENERAL CONTENT OUTLINE: TRAINING

I. Understanding and using computers as an instructional tool
   A. Historical perspectives of instructional technology
      1. Teaching machines of the 1960's
         a. Pros and cons
         b. Reasons for failure to meet educational expectations
         c. Comparisons and contrasts to microcomputers
      2. Early software programs and applications
         a. Nature of drill and practice
         b. Literacy and functional operations versus developmental instruction
      3. Developments and improvements in computer related technology
         a. Hardware capabilities
         b. Software development
         c. Peripherals
   B. Educational frameworks
      1. Computer as supplementary to direct instruction, i.e. sideline enhancer
      2. Computer as comparable to direct instruction
      3. Computer as viable in multiple instructional models
         a. Small group (cooperative learning, Socratic discussions, inquiry training)
         b. Large group (teaching through presentation, concept development)
         c. Individual (programmed learning, prescriptive instruction, clinical teaching)
   C. Experiencing software and analyzing pedagogical bases
      1. Small group investigation of existing software
      2. Large group investigation via data projection panel
         a. Consider applications through peripheral components
         b. Brainstorm curricular applications
            1). Areas of curriculum where traditional methods present difficulty or challenge
            2). Lessons that require complex demonstrations, experiments, or simulation
            3). Topical units or themes

II. Determining capabilities and implementation approaches of instructional technology
   A. Presentation of research findings
      1. Purposes that include remediation, developmental instruction, enrichment
      2. Learning outcomes possible
         a. Basic skills

b. Critical thinking skills
c. Problem solving abilities
3. Facilitating student potential
a. Computers and learning styles
b. Computers and multiple intelligences

B. Experiencing software and identifying general applications
1. Teacher testimonial and demonstration
2. Small group investigation of select software
a. Determining style and purpose
b. Identifying skills developed
c. Assessing varied modes of presentation and exchange
3. Individual assessment of potential uses for large units of study or thematic focus

III. Identifying contributions of the computer to curriculum and instruction
A. A definition of curriculum for the micro-electronic age
B. Ways in which the computer can facilitate instruction
1. Allowances for individual differences in terms of maturity and competence
2. Provision for personalized experiences that approximate levels of achievement, thus avoiding frustration associated with the effects/demands of uniform classroom instruction
3. Provision for a greater quantity and variety of electronic information input than is possible in traditional group instruction
4. Providing a means for regular, periodic diagnostic assessment of individual academic achievement
5. Extending learning opportunities beyond the classroom via telecommunications and networking possibilities
C. Correlating the computer with curriculum content
1. Exploring integration possibilities
a. Reading
b. Language Arts
c. Mathematics
2. Considering the Whole Language Movement
a. Using computers with early childhood students to promote the thinking-saying-writing-reading connection
b. Using computers to expose students to select pieces of literature
D. Selecting and experiencing corollary software through formal evaluation

IV. Investigation of the scope and sequence of an integrated learning system (ILS)
A. Comparisons of skills presented; kindergarten through

grade six
1. Compare basals and texts with ILS
2. Compare site monitoring checklists and curriculum guides with ILS

B. Determining developmental appropriateness of ILS as a basis for a core curriculum by suggesting and creating large content oriented or thematic units of study
C. Developing off-line materials to accompany computer-based instruction
1. Learning activity packets
2. Learning contracts and task sheets
3. Extended or enriched projects or research
D. Designing auxiliary computer related learning experiences
1. Use of word processor to correlate to computer-based activity
2. Incorporating data bases and spread sheets
E. Correlating existing classroom materials and teacher-made activities with specific grade level computer-based lessons

V. Training in the operational procedures and usage of the management system
A. Prescribing individual lesson formats or "learning pathways" in a structured sequence that directly correspond to classroom learning experiences and preplanned events
1. At the file server
2. At the student work station
3. Written request to lab attendant
B. Utilizing diagnostic reports
1. How to request, generate, and print
2. Interpreting and analyzing results
3. Providing reteaching and prescriptive exercises
a. On-line lesson sequences
b. Off-line, hard copy activities
C. Creating simulated curricula in reading, Language Arts, and Mathematics
1. Large group modes
2. Small group situations
3. Individual basis

VI. Identifying the positive effects of active teacher involvement and application of computer-based learning experiences
A. Empowerment of teacher
1. Changes role to that of mentor, coach, facilitator or manager rather than giver of facts and information
2. Frees teacher to concentrate efforts on
a. Developing and managing instruction rather

than spending excessive amounts of time with mundane tasks of grading, recording, etc.

b. Assisting students with skills of thinking and reasoning

B. Increased student achievement through additional interactive instructional exchanges via computer-based activities as selected by the teacher on a relevant basis

C. Reduced pupil/teacher ratio that will facilitate increased on-task time and behavior leading toward improved classroom management

D. Facilitate the teachers' responsiveness to the demands of teaching associated with the mission and philosophy of the school

1. Relativity to commitment and evidenced through annual teacher performance evaluations
2. Development of personal growth and self-esteem through a sense of accomplishment and expertise, i.e. intrinsic reward and self-satisfaction versus monetary remuneration

E. Opportunities for exchange, presentation or publication of innovations via a model school implementation

APPENDIX F

TECHNOLOGY LEADER'S TRAINING MANUAL

TECHNOLOGY LEADER'S TRAINING MANUAL

Elizabeth C. Brennan
June, 1991

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SESSION I

GOAL: TO DEVELOP AN UNDERSTANDING OF HOW COMPUTERS CAN BE USED AS AN INSTRUCTIONAL TOOL.

OBJECTIVES:

NO. 1. To acquaint participants with historical background information, developments, and recent improvements in instructional technology.

NO. 2. To develop a viewpoint toward instructional technology that recognizes computer-based learning as a viable instructional tool.

NO. 3. To identify pedagogically sound software and determine general areas of curricular application.

MATERIALS NEEDED:

1. Overhead projector; acetate duplications (or Xeroxed) of Appendix A
2. Sample teaching machines
3. Computer, Computer Lab, Data Projection Panel; select software
4. Commercial software product catalogs

CONTENT	METHODS
I. Historical perspectives instructional technology A. Teaching machines of the 1960's; media hardware and audio-visual aids such as filmstrips, films, overhead projectors, tape recorders, etc.; specific materials or programs, i.e., language master, System 80, reading machines, video tape, ITV, audio-tutorial, programmed instruction, New Century, Write to Read 1. Pros (a-d) and Cons (e-i) a. Multi-model sensory input b. Speed in training with effective mastery of content c. Applied principles of learning	I.A. Provide discussion and explanation to cover key elements. Utilize select pieces of instructional technology for demonstration purposes as listed. Engage participants in brainstorming through recollection of own experiences pros and cons, reasons for failure, and comparisons and contrasts to microcomputer.

   d. Potential to simulate
   e. Mediocre instructional technology
   f. Technical breakdowns
   g. Expense and funding
   h. Teacher resistance
   i. Teacher training requirements
2. Reasons for failure to meet educational expectations
   a. Lack of intimacy
   b. Incompatibility with process oriented curriculum as a whole or unified entity (reading, writing, etc.)
   c. Dull, boring, or lack-luster design and presentation, too similar to workbook exercises
   d. Disjointed or fragmented presentations
   e. Technical inadequacy of teachers; reluctance to utilize machines of any kind
   f. Required time-consuming planning; extra work
   g. Lack of social acceptance and viewed as of low value of priority
   h. Appeared as a fad and had limited applicability
3. Comparisons and contrasts to micro-computers

a. Microcomputers have withstood the tests of time
b. Society places high value upon computer-related technology
   1) Consider wide array of industrial applications
c. Educational legislation, organizations, and conventions provided for specific use of technology (NECC, ITEC, FETC, FACE)
d. Increasing focus on training at the college or university level
e. Empiral evidence of success in many situations

B. Early software programs and applications
   1. Drill and practice
   2. Subject oriented; isolated curricular focus
   3. Literacy and functional operations
   4. Approached instruction in accordance with an instructional theory

I.B. Elicit examples of software used in late 1970's and early 1980's or provide demonstration of multiple examples of actual software (Ex: Milliken Math, etc.) guide participants through discussion as to the nature of the programs examined

C. Developments and improvments in computer related technology
   1. Hardware cababilities
      a. Memory expansion/ speed
      b. Multiple response mode
      c. Audio/speech coupled with text
      d. Animation/graphics/ color CD ROM, hard drives

I.C. Using a chalkboard or overhead projector, visually expand a visual picture of a computer to include all components as listed and label and define accordingly, stating purpose of each element with example if possible

2. Software development
   a. Network languages and operating systems
   b. Integrated packages
   c. Improved pedagocial base
   d. Multiple skill inclusion
   e. highly interactive
3. Peripheral equipment
   a. Data projection panels
   b. CD ROM
   c. Interactive video disc
   d. Telecommunications

II. Educational frameworks and the role of teacher/ technology
   A. Computer as supplementary to teacher-led instruction
      1. Sideline enhancer
      2. Support presentation
      3. Provide visual stimulus to primarily auditory delivery mode
      4. Follow-up activity or reinforcing practice exercises
   B. Computer as comparible to teacher-led instruction
      1. Delivers facts and information
      2. Develops basic skills, critical thinking skills, and problem solving abilities
      3. Capability to simulate or present situations that would be difficult for teacher to provide
      4. Presents identical lesson over repeated exposures

II.A-C. Using the overhead projector or by reproducing as hand-outs, display and discuss the visual representations of traditional educational frameworks and restructured concept as found in Appendix A. Provide lecture and discussion as necessary to clarify key elements. Elicit varied instructional models from participants and brain-storm possibilities for use of computer related technology as listed in II.C.

C. Computer as viable in multiple instructional models in conjunction with development of student-centered classrooms
   1. Small group applications
      a. Cooperative learning
      b. Socratic discussions
      c. Inquiry training
   2. Large group applications
      a. Teaching through presentation
      b. Concept development
   3. Individual applications
      a. Programmed learning
         1) Self-paced
         2) Immediate feedback
         3) Branching capabilities
      b. Prescriptive instruction
      c. Clinical teaching

III. Analysis of pedagocical bases through hands-on experiences
   A. Integration of instructional technology where traditional methods have proven most difficult
   B. Integration where lesson development requires complex demonstrations, experiments, or simulation
   C. Integration within major topical units or themes

III.A-C. Using a computer lab facility where participants can work individually, in pairs, small groups or using a data projection panel for large group presentation, evaluate and examine select examples of popular software programs to expose participants to varied applications. Have each member list specific examples of each integration process A-C and correlate potential software. Provide multiple software catalogs from commercial vendors for perusal. Have participants create a "wish list" of desirable software.

SESSION II

GOAL: TO DETERMINE THE VARIED CAPABILITIES AND MULTIPLE IMPLEMENTATION APPROACHES UTILIZED WITH INSTRUCTIONAL TECHNOLOGY

OBJECTIVES:

NO. 1. To enable participants in recognizing the varied purposes, learning outcomes possible, and power to facilitate student potential through the presentation of research findings.

NO. 2. To identify select software for general curricular applications and to assess the merits/limitations for potential use based upon style, purpose, skills developed, modes of presentation, and curricular focus.

NO. 3. To develop a broad base for integration by suggesting specific applications with large units of study or through a classroom thematic focus.

MATERIALS NEEDED:

1. Computer, data projection panel, computer lab; select software
2. Chalkboard or large chart paper

CONTENT	METHODS
I. Research findings and study or evaluation of extant uses of computers for instructional purposes indicate effective integration in varied situations A. Multiple purposes for integration that include: 1. Remediation/Corrective 2. Development 3. Enrighment/Extension B. Wide array of skills presented and developed 1. Basic skills 2. Moral values 3. Critical thinking skills 4. Problem solving abilities 5. Cultural literacy 6. Programming, computer literacy, functional operation	I.A-B. Using a computer, select software, a data projection panel, and individual volunteer participants to provide testimonial, examine and discuss applications based on purpose and skill development. Help participants to recognize both merits and limitations of integration. List the many purposes and skills on chalkboard or large visual chart for emphasis.

C. Facilitate student potential
   1. Attention to learning styles
      a. Definition of learning styles
      b. Perceptual strengths and modalities
         1) auditory
         2) visual
         3) kinesthetic
      c. globas vs. analytic or right brain vs. left brain learners
      d. Motivation: internal vs. external
      e. Structure vs. Open-ended or creative, expressive
   2. Attention to multiple intelligences
      a. Linguistic (communicative potentials)
      b. Logical-mathematical
      c. Spatial (graphics)
      d. Musical (databases)
      e. Bodily - kinesthetic (response modes)
      f. Personal (inter, intra)

I.C. Provide lecture and discussion to develop knowledge base with respect to learning styles and multiple intelligences. Elicit and provide concrete examples of traditional teaching methods that are attentive to these concepts.

Provide select demonstration of software that is reflective of each concept, 1a through 2f, or elicit examples from participants. An examination of commercial software product catalogs as used in Session I may provide further description.

II. Experiencing and exploring particular software through hands-on experiences to determine style, purpose, skills developed, modes of presentation, curricular focus
   A. Merits, advantages, strengths
   B. Limitations, weaknesses
   C. Global applications

II. Using a computer lab facility where participants can work individually, in pairs, small groups or using a data projection panel for large group presentation, evaluate and examine select examples of software. Have participants list and record findings as noted in CONTENT, II, A-C as

acquired by means of identifying purpose, etc. and relating to ability of program to facilitate student potential. Have each group share findings orally with others.
Then, in a large group format using all of the information presented and shared, have the participants as a whole group, design recommendations for potential integration of those programs experienced.
Help the group to construct a plan that specifies integration of particular programs within large units of study or through a particular grade level thematic focus.
Elect a representative from the group to record ideas on the chalkboard. Reorganize as necessary, and when complete, copy and provide duplications to each participant; include labelling cognitive processes employed in the construction of the plan, so that participants can utilize this as a procedural blueprint for future applications.

SESSION III

GOAL: TO IDENTIFY CONTRIBUTIONS OF THE COMPUTER TO CURRICULUM AND INSTRUCTION

OBJECTIVES:

NO. 1. To develop and identify a definition of curriculum for the microelectronic age.

NO. 2. To identify various ways in which the computer can facilitate instruction.

NO. 3. To correlate the computer with distinct subject areas of reading, language arts, and mathematics for integration potential.

MATERIALS NEEDED:

1. Teacher education textbooks dealing with curriculum
2. Computer, data projection panel, computer lab facility, large selection of reading, language arts, math software
3. Xeroxed copies of Appendices B and C

CONTENT	METHODS
I. Definitions of curriculum A. Traditional 1. Content without reference to methods or materials 2. Concern with whole child or child-centered focus rather than just academic content 3. Concern with social needs, "a series of potential experiences ... set up in school for the purpose of disciplining children and youth in group ways of thinking and acting." (Smith, Stanley, & Shores, 1950 as cited by Shane, 1987, p.72) 4. Psychological in nature encompassing sum of total learnings on an individual basis	I.A. Provide lecture and discussion to elicit from participants, examples and statements defining curriculum. Record and categorize by traditional focus as listed, CONTENT, I, A, 1-4. Using a variety of teacher education textbooks for reference, clarify and verify various definitions of curriculum.

(there will be as many curriculums as there are teachers and students). B. Presentation of definition of curriculum for the application of computers or for the microelectronic age: The curriculum is a written document that outlines suggested learning experiences, but also recognizes individual differences. The curriculum reflects a consensus among faculty of the scope and sequence of various learnings and includes ways of introducing learners to the values of a given culture. An effective curriculum results in desired changes in an individual's social, psychological, and intellectual behavior.	I.B. Using overhead transparency, Xeroxed copies of Appendix B, or definition written on chalkboard, read and identify comparative or contrasting elements in relation to prior definitions. Establish encompassing nature and relate to needs for the 21st century. Elicit the intent of application in a technological versus agricultural or industrial age, and compare relative needs.
II. Ways in which the computer can facilitate instruction for varied learners/needs. A. Allowances for individual differences in terms of maturity and competence (developmental theories). B. Provision for personalized experiences that approximate levels of achievement, thus avoiding frustration associated with the effects/demands of uniform classroom instruction. C. Provision for a greater quantity and variety of electronic information	II.A.-E. Through lecture, discussion and explanation, relate key concepts to effective principles of learning, i.e., the student learns best when ... Compare and contrast efficience and effective instructional events via traditional methods. Establish positive response and attitude through presentation and demonstration of select software if necessary, or relate to previously sampled products.

input than is possible in traditional group instruction.

D. Providing a means for regular, periodic diagnostic assessment of individual academic achievement.

E. Extending learning opportunities beyond the classroom via telecommunications and networking possibilities.

III. Correlating the available computer software programs with curriculum content on a general basis for reading, language arts, and mathematics.

A. Exploring integration possibilities through areas that are traditionally troublesome or require extensive demonstration or experimentation, i.e., demand high degrees of teacher preparation and motivational presentation

1. Reading (Ex: Main idea)
2. Language arts (Ex: Parts of speech, tense agreement)
3. Mathematics (Ex: place value, fractions, division)

B. Considering the Whole Langugage Movement

1. Using computers to promote the thinking-saying-writing-reading connection
2. Using the computer to expose students to select pieces of literature
3. Comparisons and contrasts of traditional methods

III. Provide discussion and explanation to review key concepts. Have participants list specific skills within the three academic areas by grade level needs or experiences. Utilize the list later in providing individual software evaluation opportunities. Provide knowledge base information as necessary for understanding of Whole Language, or have participants share personal expertise with concept, philosophical basis, methods, materials, experiences, etc. Help participants to recognize potential of instructional technology in multiple philosophical settings.

with potentials of technology
a. Database
b. Publication

IV. Selecting and experiencing corrollary software through formal evaluation
A. Specific focus upon more precise elements of the software development.
B. Align specific computer-based activities with classroom instruction by considering upcoming events per teacher/grade.

IV. Using the skills suggested by participants as traditionally troublesome, CONTENT, III, A, provide each with a computer-based lesson that develops that skill. Using a lab facility or single computer with data projection panel, have participants formally evaluate the lesson/ program using the software Evaluation Form located in Appendix C. Share conclusions orally, or reproduce completed forms for each member of the training session. Considering topical areas of reading, language arts, and mathematics, have participants design curricular focus that includes the integration of computers. This may be assigned as a homework activity to be completed prior to next session.

SESSION IV

GOAL: TO BECOME FAMILIAR WITH THE SCOPE AND SEQUENCE OF AN INTEGRATED LEARNING SYSTEM (ILS)

OBJECTIVES:

NO. 1. To develop correspondence between skills and objectives presented in the classroom and those contained in the ILS

NO. 2. To determine the pedagogical basis employed in the ILS lessons and activities

NO. 3. To design a sequence of computer-based lessons that correspond to classroom content

NO. 4. To generate accompanying off-line, hard copy materials that could supplement the classroom instructional activities

MATERIALS NEEDED:

1. Sample texts, teachers manuals, curriculum guides, etc.
2. Copies of the ILS curriculum guide; Skills Index
3. Select, sample teachers' lesson plans
4. Computer Lab hosting networked software (ILS)

CONTENT	METHODS
I. Comparing traditional materials used in the teaching of reading and mathematics with skills provided by the ILS curriculum A. Developmental appropriateness B. Cohesion C. Comprehensiveness D. Attention to individual differences 1. Learning style 2. Mastery rates 3. Ability/Functioning levels E. Modes of presentation and delivery F. Feedback, monitoring of progress, evaluation	I. Provide participants with multiple versions of teachers' manuals of basals and core textbooks, site curriculum guides, checklists, etc., and a copy of the ILS scope and sequence of skills. Working in small, grade level groups, have participants focus on elements as listed, CONTENT, I, A-F and prepare an oral comparative statement to share with others.
II. Events of Instruction: designing curricular experiences (method and material) that are considered effective based upon degrees to which the instructional exchange is attentive to:	II. Using copies of teachers' lesson plans for instructing a particular skill, identify the corresponding subject, topic, skill, and grade level in the ILS. Allow

A. Gaining attention
B. Informing the learner of the objective
C. Stimulating recall of prerequisite learnings
D. Presenting the stimulus material (lesson delivery)
E. Providing learner guidance (coaching and prompting)
F. Eliciting the performance
G. Providing feedback
H. Assessing the performance
I. Enhancing retention and transfer (practice and application)

each participant to work through the particular lesson at the computer work station, responding and taking notes as to the events listed in CONTENT, II, A-I. Have them rank each element as presented by both the teacher-prepared lesson design and the computer-based lesson as follows:

Ø = not included
1 = poorly accomplished
2 = satisfactorily accommodated
3 = excellent presentation

Compare totals and show by a raise of hands, which mode received higher score. Discuss and evaluate.

III. Identifying, selecting and listing ILS lesson sequences that correspond to classroom instruction.
A. Reading
B. Language Arts
C. Mathematics

III. Select a particular grade level skill or topic that might involve approximately one week's instructional sequence (Ex: fractions, main idea, etc.). Provide participants with description of lessons via ILS curriculum guide or Skills Index. Have them identify and prescribe a sequence of 3-5 lessons that would effectively establish the selected learning concept. Compare suggestions orally. Highlight the efficience of the process. Discuss ways of accommodating exceptional students.

IV. Designing and generating corrollary off-line materials.	IV. Given the skill or topic developed in Section III, have participants suggest and create a variety of auxilliary activities to the computer-based experience. Discuss and share aloud.

SESSION V

GOAL: TO DEVELOP PROFICIENCY IN THE MANUAL OPERATION OF THE MANAGEMENT SYSTEM AND ASSOCIATED HARDWARE APPLICATIONS

OBJECTIVES:

NO. 1. To demonstrate the steps and procedures on various hardware that allow for:
   a) Prescription of alternate lesson sequences
   b) Adjusting student/station assignments
   c) Making permanent and temporary lesson assignments

MATERIALS NEEDED:

1. Simulated class lists of student names
2. Computer Lab hosing networked software (ILS)
3. Copies of pages from operational procedures manual

CONTENT	METHODS
I. Manipulating the hardware to prescribe lessons and make changes relative to student placement through the software management system. Methods and procedures for: A. Prescribing alternative lesson sequences as planned Session IV 1. Creating "ALPS" a. Group process b. Individual student B. Adjusting student/station assignments 1. "S PLUG" a. Absence b. Group change C. Making permanent changes in curricular sequence 1. "PLUG" 2. "ALPS" D. Making temporary lesson assignments for remedial or enrighment purposes 1. "T PLUG" E. Requesting and printing diagnostic reports 1. Individual 2. Group 3. Class	I. Refer to manual of operational procedures that accompanies software package and provide each participant with a copy (may be in abbreviated format, color coded, or symbolic for ease of operation) of the steps and procedures as listed. Discuss and provide examples of implementation using demonstration. Have participants practice in small groups at file server or individual work stations. Provide individual assistance and clarification when necessary. Apply careful attention to technical procedures.

SESSION VI

GOAL: TO ESTABLISH THE POSITIVE EFFECTS OF TEACHER INVOLVEMENT IN THE INTEGRATION OF COMPUTERS

OBJECTIVES:

NO. 1. To recognize elements of teacher empowerment, increased student achievement, improved classroom management, heightened self-esteem, and professional opportunities made possible through the use of computers

NO. 2. To identify changing student and teacher roles in a process of developing student-centered rather than teacher-directed learning experiences

MATERIALS NEEDED:

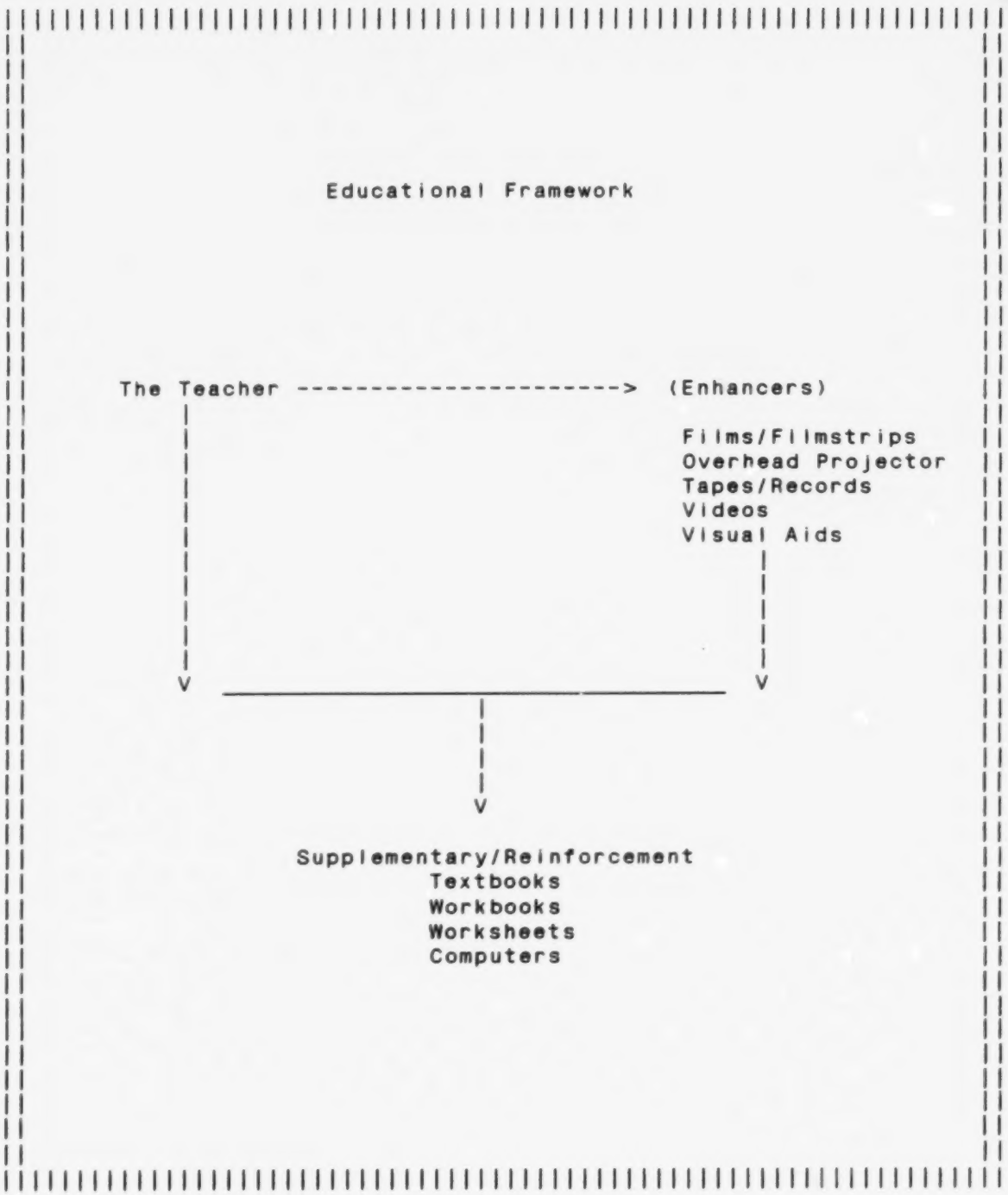
1. Chalkboard or large sheets of chart paper

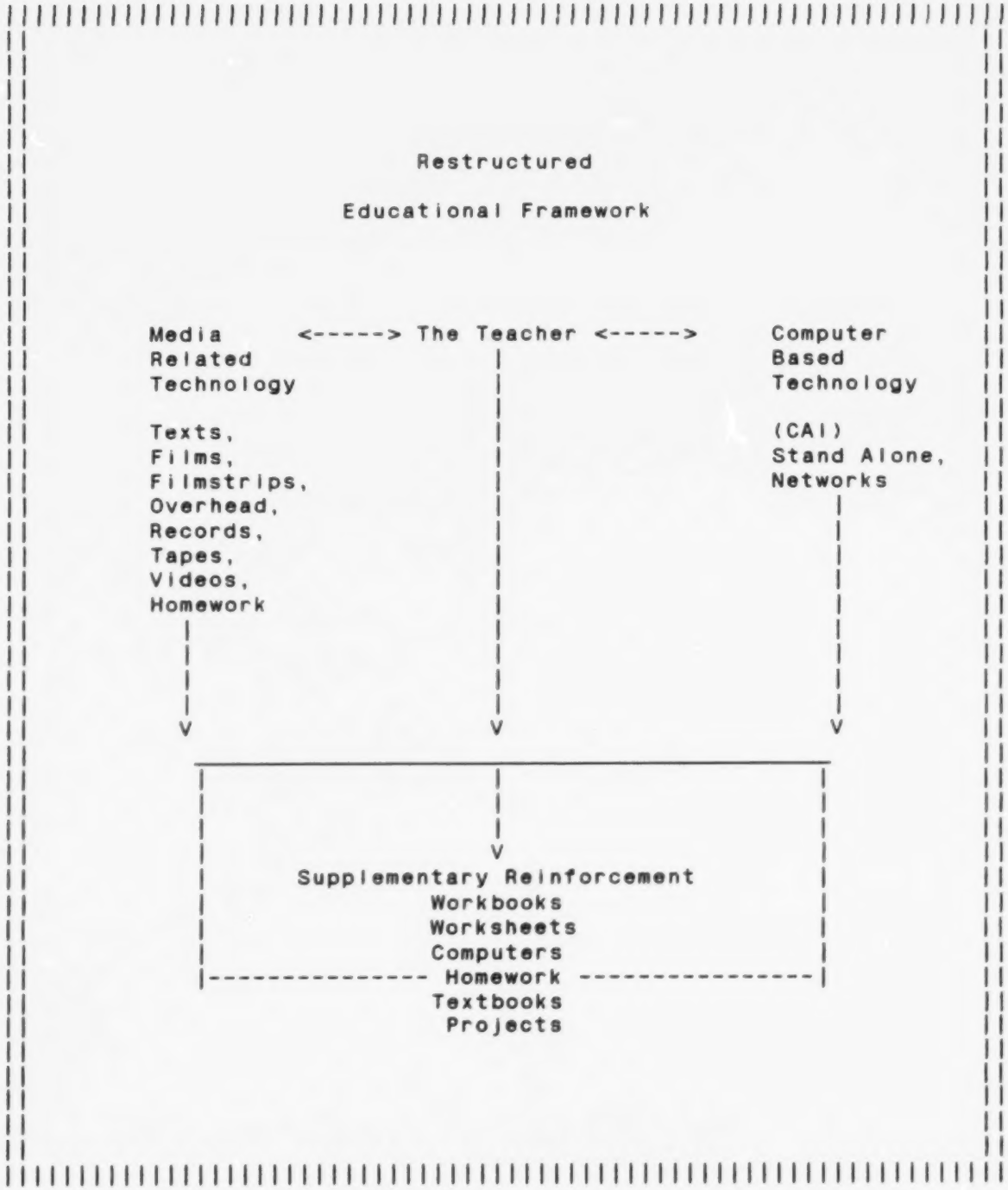
CONTENT	METHODS
I. Recognizing and exploiting the potential of instructional technology as an enabling force: A. Increased academic learning-engaged learning time B. Reduced pupil/teacher ratio leading toward improved classroom discipline and management C. Action-oriented learning as opposed to passive modes of teaching through presentation; application of varied instructional models 1. Socratic Discussions 2. Inquiry Method 3. Cooperative Learning 4. Learning Centers 5. Individualized Instruction D. Changing role of teacher to mentor or coach, manager or facilitator E. Professional growth F. Opportunities for professional recognition 1. Model School 2. Educational conferences 3. Peer-coaching	I. Have participants brainstorm and list on board as many of the "frustrating or bothersome" aspects of teaching as possible (Ex: large class size, marking papers, "too much to do - not enough time to do it", etc.) and list on chalkboard. Provide questions to elicit response if necessary. When finished, guide the discussion so that elements listed can be grouped according to common base or attribute and have participants label categories accordingly (Ex: clerical duties, inability to meet individual needs, scheduling, etc.). Elicit discussion to establish the enabling aspects of instructional technology. Provide recent copies of literature citing positive effects or major school reform efforts relative to the use of instructional technology.

Appendices

APPENDIX A

EDUCATIONAL FRAMEWORKS


Educational Framework
The Teacher
(Enhancers)
Films/Filmstrips
Overhead Projector
Tapes/Records
Videos
Visual Aids
Supplementary/Reinforcement
Textbooks
Workbooks
Worksheets
Computers


Restructured
Educational Framework
Media Related Technology
<-----> The Teacher <----->
Computer Based Technology
Texts,
Films,
Filmstrips,
Overhead,
Records,
Tapes,
Videos,
Homework
(CAI)
Stand Alone,
Networks
Supplementary Reinforcement
Workbooks
Worksheets
Computers
Homework
Textbooks
Projects

APPENDIX B

DEFINITION OF CURRICULUM

CURRICULUM FOR THE MICROELECTRONIC AGE

THE CURRICULUM IS A WRITTEN DOCUMENT THAT OUTLINES SUGGESTED LEARNING EXPERIENCES

BUT

ALSO RECOGNIZES INDIVIDUAL DIFFERENCES IN A GIVEN AGE (GRADE) GROUP

THE CURRICULUM REFLECTS A CONSENSUS ... AS TO THE SCOPE AND SEQUENCE OF VARIOUS LEARNINGS AND INCLUDES WAYS OF INTRODUCING LEARNERS OT THE VALUES OF A GIVEN CULTURE.

AN EFFECTIVE CURRICULUM RESULTS IN DESIRED CHANGES IN AN INDIVIDUAL'S

- SOCIAL BEHAVIOR -
- PSYCHOLOGICAL BEHAVIOR -
- INTELLECTUAL BEHAVIOR -

APPENDIX C

SOFTWARE EVALUATION FORM

SOFTWARE EVALUATION FORM

Please indicate your reactions to the following questions about this program. Use the space at the bottom of the page to summarize your overall impression of the program.

Name of Program	Computer Type
Subject Area	Grade Level(s)
Specific Skills Developed	Your Name
Type of Application	Title
Time Required	Date

1. Does the material or lesson meet its objectives as stated in the documentation?

2. What suggestions would you make for improvement?

3. Is this program or lesson educationally valuable to you? Why?

4. What grade level could use the program? How?

5. Will this program interest your students enough that they will want to use it more than once?

6. Please use this space to describe your overall reaction to this program.

APPENDIX G

FORMATIVE/SUMMATIVE EVALUATION OF TRAINING

FORMATIVE/SUMMATIVE EVALUATION OF TRAINING

Rate the following statements according to:
1 = Strongly Agree; 2 = Agree; 3 = Disagree;
4 = Strongly Disagree; 5 = Not applicable.
Respond with narrative comments 1-13 in the space provided or on the back of this sheet.

	1	2	3	4	5
1. I will be able to use what I learned in this training.					
2. Objectives were clearly communicated.					
3. Objectives for this session match needs identified through needs assessment.					
4. Material covered was relevant to session objectives.					
5. Instructor used a variety of educational approaches.					
6. Level of difficulty and the content were reasonable.					
7. The materials and delivery were appropriate, relevant and helpful.					
8. Instructor's scheduling and coordination were efficient.					
9. Instructor was well-prepared and organized.					
10. Instructor was knowledgable in content presented.					
11. Instructor used humor appropriately.					
12. Instructor contributed effectively to my learning.					
13. Equipment and site facilities were appropriate.					

APPENDIX H

SOFTWARE EVALUATION FORM

SOFTWARE EVALUATION FORM

Please indicate your reactions to the following questions about this program. Use the space at the bottom of the page to summarize your overall impression of the program.

Name of Program	Computer Type
Subject Area	Grade Level(s)
Specific Skills Developed	Your Name
Type of Application	Title
Time Required	Date

1. Does the material or lesson meet its objectives as stated in the documentation?

2. What suggestions would you make for improvement?

3. Is this program or lesson educationally valuable to you? Why?

4. What grade level could use the program? How?

5. Will this program interest your students enough that they will want to use it more than once?

6. Please use this space to describe your overall reaction to this program.

APPENDIX I

TEACHER REQUEST FORM

TEACHER REQUEST FORM

Teacher: _____

Grade: _____ Section: _____

Add the following new students...

Name	Placement Level Reading	Math
1.		
2.		
3.		
4.		
5.		

Change the placement of the following students...

Name	Placement Level Reading	Math
1.		
2.		
3.		
4.		
5.		

Delete the following students...

Name	Placement Level Reading	Math
1.		
2.		
3.		
4.		
5.		

Program the following lesson sequence for _____:

Reading _____, _____, _____, _____

Math _____, _____, _____, _____

Date Completed: _____

Comments: